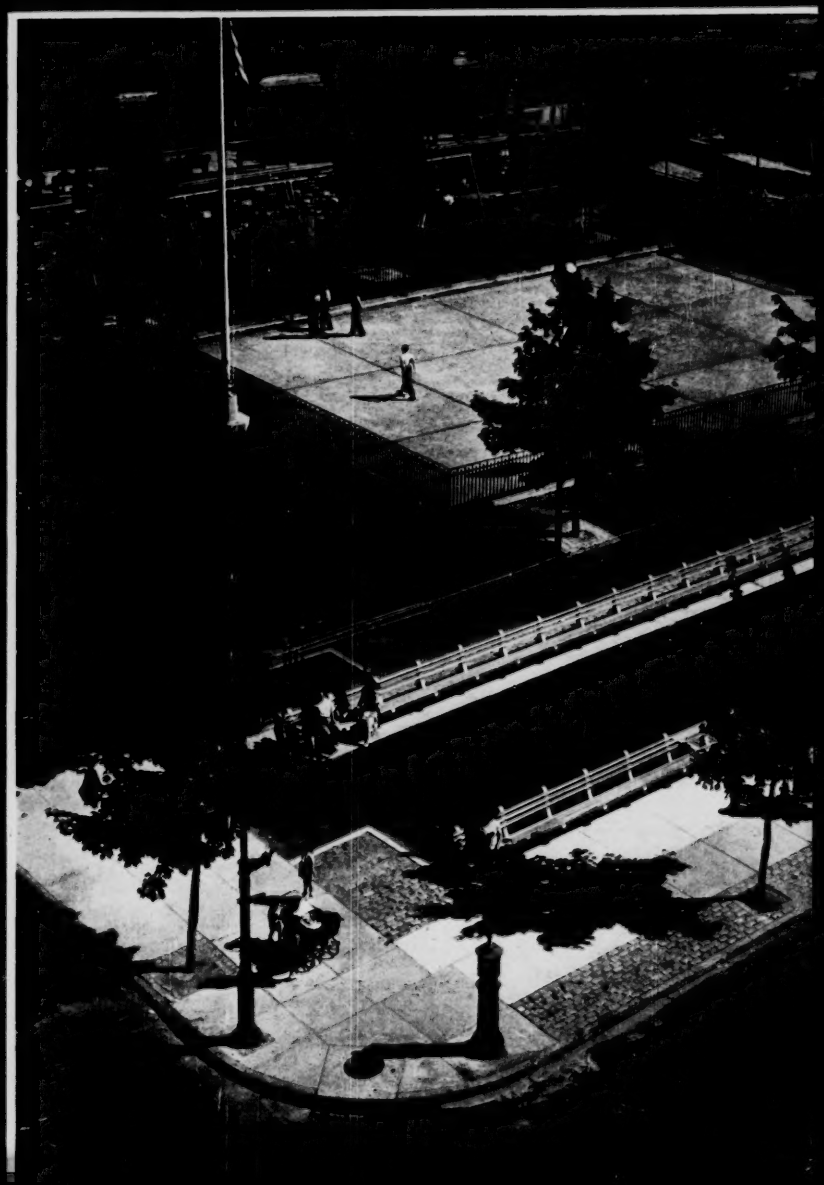
STANDARDIZATION

Formerly Industrial Standardization

News Magazine of the American Standards Association, Incorporated



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Nat Machine Tool Builders' Assn
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Nat Paint, Varnish and Lacquer Assn, Inc
Nat Retail Dry Goods Assn
Nat Safety Council
Outdoor Advertising Assn of Amer, Inc
Oxychloride Cement Assn
Photographic Mfrs Group:
  Ansco Div of Gen Aniline & Film Corp
  Eastman Kodak Co
  E. I. du Pont de Nemours & Co, Photo Products Dept
Portland Cement Assn
Radio Mfrs Assn
Screw Industry Stds Com:
  Machine Screw Nut Bur
  Sheet Metal Screw Statistica Service
  U.S. Cap Screw Service Bur
  U.S. Machine Screw Service Bur
  U.S. Wood Screw Service Bur
Soc of Automotive Engrs, Inc
Soc of Motion Picture Engrs
Structural Clay Products Inst
Telephone Group:
  Bell Tel System
  U.S. Independent Tel Assn

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Marble Inst of Amer
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Nat Assn of Wool Mfrs
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Photographic Soc of Amer, Inc
Red Cedar Shingle Bur
Scientific Apparatus Makers of Amer
Textile Color Card Assn of the U.S., Inc
Textile Distributors Inst, Inc
Veneer Assn

Company Members—More than 2400 companies hold membership either directly or by group arrangement through their respective trade associations.

Marginal Notes

Roots to Grow On—

Richard P. White, author of the article "How Green the Leaf—How Deep the Root?," knows at first-hand about the value of standardization. He directs the work of the Committee of Standards of the American Association of Nurserymen and is executive secretary of that association. Also a business leader, he is a past president of the American Trade Association Executives. We asked him for some marginal notes on the importance of the horticultural standardization work . . . "I consider the work of the association, resulting in the present issue of American Standard for Nursery Stock, Z60.1-1949, to be one of the most valuable accomplishments of the association. Without these standards, the industry would be confronted with large numbers of business misunderstandings between buyer and seller due to the fact that our commodities are living things and are not manufactured machine tool operations. Variations in sizes, of course, are inevitable when a producer depends upon the weather as one of his raw products that go into his commodity. Horticultural standards have served as the basis of standardizing business practices as well as the commodity itself."

The U.S. Delegates to International Meetings Have Their Say—

Strong delegations from the United States attended a number of the committee meetings of the International Organization for Standardization at London and Paris this spring. Because of the importance of the work being done by these international committees, an entire session of the ASA annual meeting was devoted to them, with Joseph A. Greenwald, economist of the International Resources Division, U. S. Department of State, highlighting their significance in a talk on "What Does International Standardization Mean to the United States?" For the benefit of those who could not attend this meeting the reports are published in this issue (pages 288 to 296). Mr. Greenwald's speech will be in the Annual Meeting number (December).

A Successful Company Standards Program—

In studying how STANDARDIZATION can best help its readers, we are faced with the problem that company organizations vary in almost as many different ways as there are different company members. As someone put it, "The policies, procedures, and practices are never the same in any two organizations. While one concern would consider its standards activity a part of engineering, another would consider it as a function of purchasing or of tool engineering or it would be a separate department answerable only to management."

For this reason, some company men think we talk too much about how company standardization programs operate—or, as they would put it, we talk too much and don't say enough.

We are sure you will agree, though, that the article contributed in this month's issue by Mr Watson of the Link-Belt Company is not in this classification. It has plenty to say—and says it.

A Federal Charter for ASA—

One of the most important developments in the history of the American Standards Association took place in the U.S. Senate last month. This was Senator Flanders' introduction of Senate Bill S.2645, for the incorporation of the American Standards Association under a Federal charter. The text of the bill is given in full in this issue. (See page 286.)

Our Front Cover

Succeeding generations of children have convinced the New York City Park Department that low shrubs are a poor landscape risk in the city playgrounds—too easily trampled during games of hide and seek. Shade trees, tall enough to defend themselves and tall enough to "frame-out" the city sky-line, are the rule. Trees must pass rigid uniformity tests before planting. See article on horticultural standards, page 298 of this issue. Photo, New York City Park Department.

Opinions expressed by authors in STANDARDIZATION *are not necessarily those of the American Standards Association.*

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Standardization is dynamic, not static. It means not to stand still, but to move forward together.

In This Issue

ASA

Reg. U. S. Pat. Off.

Ruth E. Mason, Editor Dollie Carpenter, Production Editor

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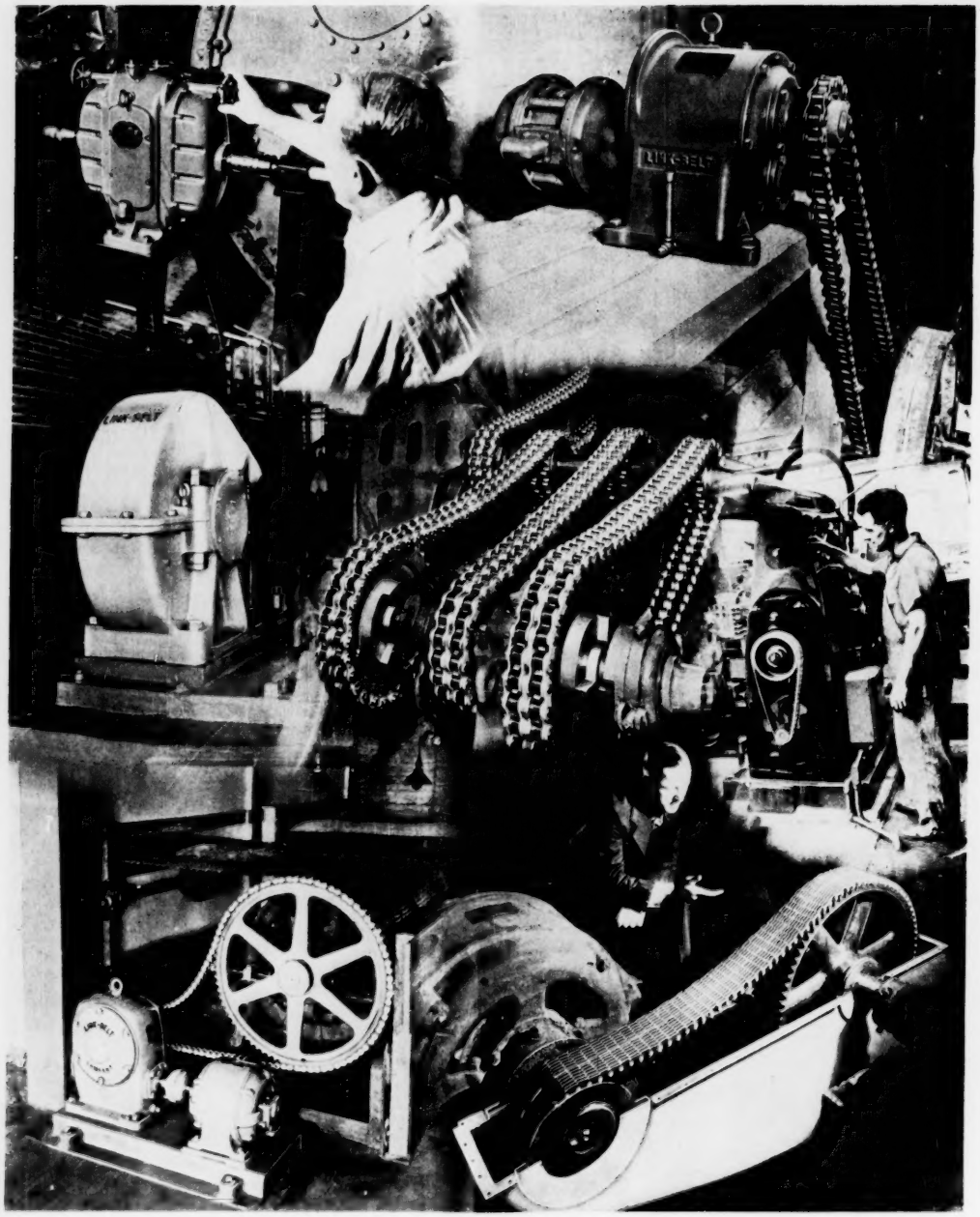


Plant standards at the Link-Belt Company extend far beyond the general engineering division. Active co-operation between all the vital departments has accomplished a successful company-wide standards program.

Standards at Link-Belt Company

by Harold F. Watson

Assistant Chief Engineer, Link-Belt Company

THE value of standards in the efficient conduct of manufacturing enterprise has always been recognized at Link-Belt Company. Our company is composed of a number of geographically separated manufacturing plants and offices and the development of standards to coordinate their activities has been a necessity. Standard departments have formed a part of the engineering organization of the major plants for nearly 50 years and standards have played an important part in the development of the company and its products.

Standardization is considered to be an engineering group responsibility at Link-Belt Company. The final designs of our products and the shop drawings from which they are manufactured are made in engineering departments. Specifications for purchased parts and raw materials required for manufactured products are subject to engineering approval, and many originate in engineering departments.

While the engineering group in the past has led the way in the development and use of standards at Link-Belt Company, present plans provide for complete participation in this work by active representatives of all important groups, such as purchasing, production, shop methods, accounting, sales, and last but by no means least, management itself.

Our ultimate goal is a complete group of active standards which are a product of the best thought and experience of all groups, and for the use and continued growth of which all groups feel a proprietary responsibility.

Standards that are common to all plants may be defined as General Company Standards.

The principal standardizing agency for general company standards is the General Engineering Division of the company which is under the direct leadership of the Vice-President in charge of Engineering. This division is organized to furnish a variety of engineering services to any or all plants and offices. One of its important functions is the development and maintenance of Company Standards.

General Company Standards are prepared by the General Engineering Division with the cooperation and assistance of the plant standards departments that serve as contact points between the General Engineering Division and the plant group interested or affected.

General Company Standards are divided into six main groups. They are:

1. Engineering Practices.
2. Material Specifications.
3. Commercial Parts Specification Drawings.
4. Name Plates.
5. Standard Products Drawings.
6. Dimension Sheets and Selection Data Sheets for Standard Products.

All standards and drawings with exception of those in group 5 are prepared in a form suitable for assembling in binders which serve as reference books.

Engineering Practice Standards, Material Specifications, and Commercial Parts Specification drawings are made on $8\frac{1}{2}$ x 11 in. sheets or in $8\frac{1}{2}$ x 11 in. pamphlets.

Name Plate drawings, dimension sheets, and selection data sheets are preferably made on $8\frac{1}{2}$ by 11 in. sheets but when necessary are made on 11 x 17 in. sheets that can be folded to fit into the binders for $8\frac{1}{2}$ x 11 in. sheets.

Each standard is issued and maintained as an entity. The plant standard departments assemble them into as many complete reference books of each group as may be required by their particular manufacturing plant and engineering department operations, using binders which are furnished complete with proper indexes by the General Engineering Division for that purpose.

Engineering Practice Standards

Engineering Practice Standards are the principal instruments for obtaining and guiding uniform company practices in drafting, nomenclature, parts identification, etc, and integrating them into common coherent means for the expression of the engineering function.

Engineering Practice Standards include both standards for design and standards defining engineering procedures. The latter are of the utmost importance as they form the foundation of the whole Company Standards structure.

Engineering Practice Standards defining engineering procedures are developed by a group composed of the chief engineers of the plants acting under the leadership of the Vice-President in charge of Engineering. Representatives of other groups such as accounting, production, methods, purchasing, and sales are added to the engineering group when their advice is needed or when their interests are involved.

Engineering Practice Standards are prepared, issued, and maintained by the General Engineering Division. This Division serves as a coordinating agency to edit proposed standards, arrange them in finished form, and secure final approval of the chief engineers of the plants before issuing.

Engineering Procedure Standards are mandatory when once approved by the engineering group and issued under the chief engineer's (Vice-President in charge of Engineering) authority.

Design Standards may be mandatory, partly mandatory and partly advisory, or entirely advisory.

Engineering Practice Standards have been completed for the most important engineering procedures and are now in force. They include:

1. Instructions for applying Link-Belt Products Classification Drawing System.
2. Instructions for Contract and Order Drawing Systems.
3. Instructions for applying Link-Belt Estimate Drawing Classification System.
4. Instructions for indicating dimensions with tolerances.
5. Instructions for numbering patterns.
6. Instructions for the preparation and use of Raw Material Specifications.

A manual of drafting practice based on the American Standard, Drawings and Drafting Room Practice, Z14.1-1946, is in course of preparation.

The Link-Belt Products Classification Drawing System is the keystone of our entire system of engineering standards. It defines the basic procedures of classifying, indexing, distrib-

uting, and maintaining drawings, specifications, and instructions, and provides a definite parts identification system. Inasmuch as it defines the amount and kind of information that is given on company drawings (drawings in company-wide use), it provides for and controls the use of other important standards such as those covering the use of tolerances, surface quality specifications, and material specifications.

Drawings intended for use in repetitive manufacture, that may be useful to two or more plants or offices, and all standard drawings, are considered company drawings, and are made in accordance with the Link-Belt Products Classification Drawing System. Job drawings and estimate drawings, although made under different procedures, follow closely standard practices.

James E. Moore

Specifications and dimensions on company drawings are limited to those that define the engineering requirements of the finished part or product shown. The means for obtaining or fulfilling the specifications is not given. Shop procedures, equipment, and methods are considered manufacturing division problems that may vary from plant to plant and with available equipment, and the elimination of reference to them gives the manufacturing divisions maximum latitude in their development and use.

Company drawings carry no plant or office identifying data and are readily transferred from one plant or office to any other as the manufacture of the parts defined may indicate.

Company drawings, including those made in accordance with the estimate, and contract and order systems, are confined to four sizes. They are:

$8\frac{1}{2}$ x 11 in.
11 x 17 in.
17 x 22 in.
22 x 34 in.

These are the same as the first four sizes specified in American Standard Z14.1-1946, Drawings and Drafting Room Practice.

As might be understood from the title of the system, drawing numbering and part identification numbers (part numbers) are based on the classification of material and products shown on drawings.

Material is classified in its own right as far as possible in terms of standard nomenclature. The use of product names for modifying the description or nomenclature of parts or material is avoided wherever possible. For instance, antifriction bearings are defined as roller bearings, ball bearings, etc. with additional terms as required to define the type. Terms such as vibrator shaft bearing, take-up thrust bearing, etc. are not used.

Arbitrary numbers are assigned to each classification; for instance, the number 323 has been assigned as the classification number for ball bearing assemblies, unmounted. Classification numer 324 has been assigned to roller bearing assemblies, unmounted. An index to classifications is prepared by the General Engineering Division. This index is maintained in all of the plants of the company and kept up to date on a 30-day basis.

Drawing numbers are composed of the classification number, a letter indicating the size of the tracing, and the sheet number of the drawing within the classification. The drawing of a specific roller bearing on an $8\frac{1}{2}$ x 11 inch sheet would therefore be numbered 324W96. The original tracings of the parts class sheets showing all drawings made in each classification are made by the plant standard department to whom the various classifications are assigned on the basis of frequency of use. Copies of all new and revised parts class sheets are interchanged between all plant standard departments and the General Engineering Division every 30 days. This practice provides a complete index in every plant and office of all of the company drawings regardless of where made or maintained. The savings in time and money possible through the interchange of designs and elimination of duplication of effort and re-design are considerable and should increase as the procedure is used.

Part numbers are composed of the number of the drawing on which the part is detailed and figures indicating single pieces (466W24-2), or letters (493W16-A) indicating composite pieces or groups. An important exception to this piece and group numbering is made in the case of commercial parts which will be mentioned later on.

Drawings of parts may not be changed so that parts are not completely interchangeable with all parts previously made from the drawings. Revised parts, not interchangeable with the parts originally made, are considered new parts and new drawings are required.

Raw Material Specifications

Specifications for raw materials are of two general types.

1. Specifications for basic raw materials.
2. Specifications for processed raw materials.

A basic raw material specification is an expression or formula that defines the desired chemical limits or physical properties, or both, of a material regardless of the physical form in which it is purchased.

Basic raw material specification numbers are similar to those used in American Society for Testing Materials specifications and in Society of Automotive Engineers — American Iron and Steel Institute specifications for steel composition, and are used in the same way.

Basic raw material specifications are made up on data sheets covering groups of related material. Where more than one sheet is required to cover a group, a pamphlet is made

under a single drawing number. Typical of these basic raw material specifications is "Specifications For Basic Raw Material—STEEL.905Y1."

Most basic raw material identification numbers are simply control numbers assigned to specifications copied from industry or technical society standards. For these specifications the industry or technical society identification is given for reference but is held subordinate to the Link-Belt specifications.

Processed raw materials are materials processed into forms suitable for further processing into Link-Belt products. Typical processed raw materials are such items as plates, shapes, shafting, rope, paper, fabric, plastics, etc.

Processed raw material specifications are divided into two sections. The first section is the purchase specifications couched in industry standard terms. Industry or technical society standard identifications are used as part of the purchase specifications when available.

The second section amplifies the purchase specifications and contains extracts from the technical society or industry specifications cited in the purchase specifications, giving the physical and dimensional properties of the material for the use of our engineers and manufacturing and inspection departments. Instructions for use of the specification number as stock or requisitioning identification is also given.

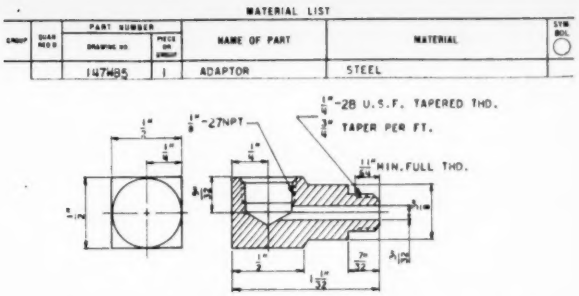
Commercial Parts Specification Drawings

Commercial Parts Specification drawings are defined as drawings of parts made from vendors' own standards, or standards set up by industry or technical societies and adopted by them for manufacturing.

Commercial parts drawings are intended primarily for control within the company of purchasing and inspection, as source of parts identification, and for certifying information regarding parts to our purchasing, engineering, and manufacturing groups.

As far as possible, Link-Belt Company avoids detailing special parts or writing special specifications of their own, and uses available industry or technical society standards to the fullest extent warranted by their suitability.

In most cases these drawings are made by selecting the most suitable industry or technical society specifications for parts of suitable quality and certifying these standards back to the vendor for supplying parts specified, and as assurance against the vendor making changes in dimensions, quality, and interchangeability. Extracts from the standard or standards used are given on the drawings for use in inspection, identification of parts, and the certification of information to our people.



A portion of a Commercial Parts Drawing—Drawing numbers show part classification, fit into interplant index system.

Commercial Parts Drawings are prepared by the General Engineering Division on demand for any of the design groups at any of the plants. The General Engineering Division distributes reproduceable copies of all drawings and maintains them in all plant standard department files. No effort is made to control the use of parts through these drawings. This is done through Engineering Practice Standards which guide the user in selecting preferred types and sizes.

Part numbers for commercial parts are composed of the specification drawing number suffixed with specific size dimensions. For instance, drawing 126W375 contains the complete specifications for all ASR Hex head semifinished bolts of a certain type. 126W375-1½ x 3, 126W375-7⁄8" x 4 are part numbers for specific sizes of bolts of this specification.

Name Plates

Name plates are considered a company standard activity. It is necessary that they be of uniform design and used uniformly throughout the company.

Name plate designs are developed to their final form by a group under the leadership of the chief engineer of the company, which is composed of responsible members of the Advertising and Legal Departments, and the General Engineering Division.

Requests for new name plates and revisions to existing name plates may originate at any point in the company organization, and such new name plates and revisions in finished form are subject to the approval of the engineering group responsible for the design of the product on which they are used.

The Advertising Department composes all name plates and is responsible for styling, including the color scheme, completeness, and general suitability. They are also responsible for the procurement of all name plates, and individual plant requirements are filled through purchase orders to them. Some general purpose name plates that are used by a number of plants are carried in stock by the Advertising Department and orders for name plates used by more than one plant are combined to reduce costs.

The Legal Department reviews all name plate designs in their finished form to insure the proper use of patent and license references, trademarks, and trademark registration references.

The General Engineering Division acts as a general coordinator, develops the part numbers of the name plates, and makes all name plate drawings.

Name plate drawings are photographic reproductions of the actual name plates when finished. The color scheme may be interpreted from the black and white drawings by means of notes on the drawings.

Prints or reproduceable copy tracings of all name plate drawings are maintained in all plants and engineering offices of the company. Binders suitable for making up reference books of the drawings are furnished by the General Engineering Division.

Standard Product Drawings

Standard Products drawings, i.e., drawings required for repetitively manufactured products, are prepared by any of the company plant engineering groups or by the General En-

gineering Division, in accordance with the procedures set forth in the Engineering Practice Standards governing the making, issuance, and maintenance of drawings.

Drawings once made or parts to which part numbers have been assigned may not be duplicated under other numbers. Custody of master tracings may be transferred from plant to plant but all copies are subservient to the master tracing at all times and may not be revised except to accord with the master tracing.

Dimension Sheets and Selection Data Sheets

Dimension Sheets and Selection Data Sheets are intended to provide certified dimensions of commonly used products and standard parts, and data on physical characteristics or inherent properties that will guide their use. Many of them define the company's engineering policy in regard to the selection and use of purchased commercial parts and raw materials and are important means for the guidance and control of purchasing costs, inventory costs and variation, and product quality.

They are prepared by the General Engineering Division from information furnished by the plants responsible for the design and manufacture of the product involved, or, in the case of selection data sheets of general interest, in cooperation with the groups in the different plants that are interested in, or affected by, their use. In the latter case, the General Engineering Division serves as a coordinating agency.

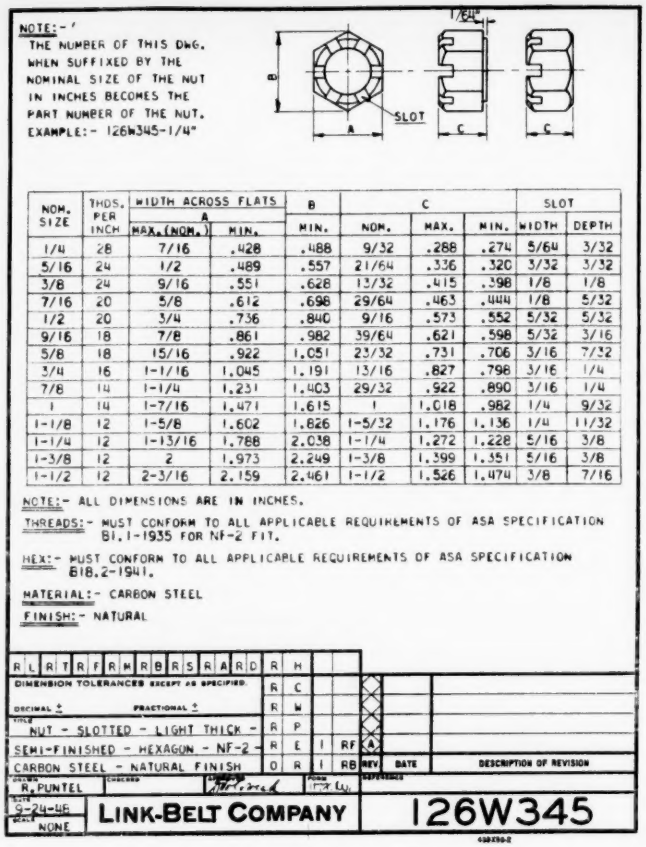
The General Engineering Division maintains these sheets in all the plants and engineering offices of the company in the form of single sheets or pamphlets suitable for use in reference binders. They also furnish the binders complete with proper indexes to the plants who make up the number of reference books required by their divers activities.

Use of Standards by Others

The use of standards by the engineering groups and designers is obvious and needs no explanation here. Standards are a part of the designer's tool kit.

Link-Belt standardization is an aid to but not subordinate to purchasing. Specifications and parts drawings are made up so that they can be used as purchase specifications and attached to purchase orders covering only quantities, sizes, shipping instructions, financial stipulations, delivery information, etc.

The use of these drawings and


NOTE:- THE NUMBER OF THIS DWG. WHEN SUFFIXED BY THE NOMINAL SIZE OF THE NUT IN INCHES BECOMES THE PART NUMBER OF THE NUT. EXAMPLE:- 126W345-1/4"

NOM. SIZE	THDS. PER INCH	WIDTH ACROSS FLATS A MAX. (NOM.)	A MIN.	B MIN.	C NOM.	C MAX.	C MIN.	SLOT WIDTH	SLOT DEPTH
1/4	28	7/16	.428	.488	9/32	.288	.274	5/64	3/32
5/16	24	1/2	.489	.557	21/64	.336	.320	3/32	3/32
3/8	24	9/16	.551	.628	13/32	.415	.398	1/8	1/8
7/16	20	5/8	.612	.698	29/64	.463	.444	1/8	5/32
1/2	20	3/4	.736	.840	9/16	.573	.552	5/32	5/32
9/16	18	7/8	.861	.982	39/64	.621	.598	5/32	3/16
5/8	18	15/16	.922	1.051	23/32	.731	.706	3/16	7/32
3/4	16	1-1/16	1.045	1.191	13/16	.827	.798	3/16	1/4
7/8	14	1-1/4	1.231	1.403	29/32	.922	.890	3/16	1/4
1	14	1-7/16	1.471	1.615	1	1.018	.982	1/4	9/32
1-1/8	12	1-5/8	1.602	1.826	1-5/32	1.176	1.136	1/4	11/32
1-1/4	12	1-13/16	1.788	2.038	1-1/4	1.272	1.228	5/16	3/8
1-3/8	12	2	1.973	2.249	1-3/8	1.399	1.351	5/16	3/8
1-1/2	12	2-3/16	2.159	2.461	1-1/2	1.526	1.474	3/8	7/16

NOTE:- ALL DIMENSIONS ARE IN INCHES.

THREADS:- MUST CONFORM TO ALL APPLICABLE REQUIREMENTS OF ASA SPECIFICATION B1.1-1935 FOR NF-2 FIT.

HEX:- MUST CONFORM TO ALL APPLICABLE REQUIREMENTS OF ASA SPECIFICATION B18.2-1941.

MATERIAL:- CARBON STEEL

FINISH:- NATURAL

ALTERATIONS STANDARD R H
DIMENSION TOLERANCES EXCEPT AS SPECIFIED. R C
DECIMAL ± FRACTIONAL ± R W
TITLE R P
NUT - SLOTTED - LIGHT THICK - R E I RF A
SEMI-FINISHED - HEXAGON - NF-2 - R E I RB REV. DATE DESCRIPTION OF REVISION
CARBON STEEL - NATURAL FINISH O R I RB
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Parts drawings aid in purchasing as well as engineering.

specifications as purchase specifications is not mandatory. The Purchasing Departments may, if they so choose, use them as a guide only in preparing purchase orders or specifications of their own when they consider this more suitable. The Purchasing Departments are, however, responsible for obtaining material exactly as called for on the specification or parts drawings, and supplying the receiving and inspection groups with the specification or drawing numbers so that materials or parts may be properly identified, inspected, and stored.

Raw material specifications and commercial parts drawings are used by the inspection and receiving departments for identifying and inspecting incoming material. They furnish the stores department with part numbers for identifying the materials and parts on their shelves or in their bins and stores records.

Part numbers from Raw Material Specifications, Commercial Parts drawings, and Product drawings are used by the Accounting, Estimating, and Standard Costs groups for the positive identification of material and to save time and chance of error in writing up items in their records. They are of especial value in connection with Standard Stock Lists and Cost Lists, discount lists, etc.

Part numbers are used by the Sales Department as a means for exact identification in authorizations to manufacture that are issued to the fabricating groups. Model numbers, catalogue numbers, and product descriptions are interpreted by them into the part numbers of up-to-date details of parts or complete products.

Part numbers from drawings of all types are extensively used in parts lists and parts price lists furnished our customers for the identification

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Now Available – Style Manual for Standards

Standardization should apply to American Standards as well as to the materials and products they cover. This was the thought which led to the preparation of a Style Manual to help bring about greater uniformity in the presentation of technical data, in American Standards published by the American Standards Association, and by the sponsor organizations. Now, after two successive editions issued in multilith form, a new edition has been published in a form more easily usable.

The Style Manual is offered as part of an editing service made available by the Association to sponsors and sectional committees. Intended primarily for use by committees under the procedure of the American Standards Association, it also contains recommendations and suggestions which may be helpful to any organization engaged in editing and publishing technical documents.

Authoritative reference sources listed in the book and on which the manual is based include Webster's New International Dictionary, Second Edition, the University of Chicago Style Manual, and approved American Standards for abbreviations, letter symbols, and drawing practices. The principal sections make recommendations on outline form and numbering; capitalization; punctuation; spelling; abbreviations for technical terms; tables and illustrations; bibliographical style; and general format.

"The final draft of a standard should be carefully edited before circulation to the committee for the final letter ballot, so as to eliminate, as far as possible, objections based on style, punctuation, arrangement, headings, numbering, or the like," the introduction explains.

"In the preparation of American Standards, it is recommended that this document be used in conjunction with The Organization and Work of ASA Sectional Committees, PR 27. It is also important that the provisions of standards being developed be kept consistent with those of other American Standards. In working out specific standards, efforts should be made to apply and use general standards, such as those on preferred numbers, on rounding off numerical values, on definitions of terms wherever they are available, and on letter symbols and abbreviations, and international standards wherever they apply."

The new edition of the manual incorporates reference to several changes in detail in the publication of American Standards. A section has been added dealing with the placement of a Universal Decimal Classification (UDC) number on official documents. Several sections have been enlarged to present more detailed information on such subjects as the numbering system used, the kinds of type faces, and to include a policy statement to be placed on the inside cover page of all American Standards. The newly approved sizes for American Standards are listed for the first time, and the book has been expanded to include several more illustrations of typical standards as well as a new and complete index.

Copies of this 28-page manual (8½ x 11 in.) in heavy paper cover may be obtained from the American Standards Association, 70 E 45 Street, New York 17, N. Y., at the following rates:

1 to 9 copies	$1.00
10 to 24 copies	.80
25 to 99 copies	.70
100 to 249 copies	.65
250 to 499 copies	.60
500 to 999 copies	.55

Technique Seminar Set for January

ANOTHER private five-day seminar on the principles and technique of organizing company standardization work and the formulation of standard specifications will be held by Dr John Gaillard, mechanical engineer on the staff of the American Standards Association and lecturer in industrial standardization at Columbia University. The time will be January 23 through 27, 1950, and the place, Room 501-A, Engineering Societies Building, 29 West 39 Street, New York City. There will be ten conferences, two every day, starting at 9:30 a.m. and 1:30 p.m.

Previous seminars of this kind, held since June, 1947, have been attended by standards engineers, chief engineers, quality control directors, chief inspectors, methods engineers, industrial engineers, specifications engineers, and others, representing altogether 55 organizations.

For registration details, write Dr John Gaillard, 400 West 118 Street, New York 27, N. Y., or phone him at the American Standards Association, New York, Murray Hill 3-3058.

The ten lectures to be presented by Dr Gaillard, each to be followed by round-table discussion, are outlined below, in order of presentation.

1. Development of various types of technical and managerial standards with the evolution of industry. Significance of the concepts "performance" and "measurement." Meaning of the concept "standard" to the individual and the group. Increasing importance of standardization in industry during its development from the primitive stage to modern mass production methods.

2. Essential functions of standardization: establishment of a temporary constant level of the requirements of a recurrent objective (stabilization), and coordination on that level of all factors involved in the attainment of the objective. Progress-time curve of technical development of an industrial product and approximation of this curve by periodically revised standards. Means of keeping a standard flexible.

3. Definition and general characteristics of a standard. Specification of basic standard requirements in terms of performance characteristics. The need to be specific, complete, clear, and concise in standards. Nominal and basic values, maximum permissible deviations, limits and tolerances. Effect of tolerances on revision and unification of standards. Designation of numerical requirements.

4. The relation of standards to the problem of quality control in general. Analysis of the concepts "quality" and "control." Collecting quality data through inspection and testing. Use of these data for the acceptance or rejection of product and for the establishment and maintenance of control of the production process. Control chart method. Advantages of the statistical approach in coordinating specification, production, and inspection.

5. Dimensional quality control. Standards and units of length: yard, meter, and lightwave basis. Reference temperature for measurement and gaging. Inch-millimeter conversion ratio. Systems of cylindrical fits. Classes and grades of fits. Basic hole and basic shaft systems. Selective assembly. Review of American, British, and international (ISA) systems.

6. Inspection of component parts by measurement or gaging. Gagemaker's tolerances and permissible gage wear. Loca-

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In The Senate—Bill to Incorporate ASA

ON October 6, Senator Ralph E. Flanders of Vermont, introduced a bill (S. 2645) into the Senate of the United States to recognize the public service nature and performance of the American Standards Association by incorporating the ASA under a Federal charter. The bill has been referred to the Committee on the Judiciary.

In presenting the bill, Senator Flanders said:

"Standards are of fundamental importance to government and industry alike. And it is highly important that there be the closest teamwork between them in the development and in the use of standards which are of primary concern to both."

After explaining that incorporation of the ASA under the laws of the State of New York had resulted in withdrawal of many of the Government departments from active participation in the work of the ASA, Senator Flanders said:

"The bill . . . has two major purposes: First, . . . to make it clear that it is the policy of the Congress to encourage intimate and effective cooperation between the Federal Government and industry in the establishment of common standards acceptable and useful to both—in our peacetime economy and in preparation for defense; second, to provide a congressional charter for the ASA, and to authorize the Federal departments and agencies to make full use of the facilities of the association in cooperating with industry, labor, and consumer groups in matters having to do with standards.

"For 30 years industry and Government have worked together, through the national clearinghouse—the American Standards Association—in developing national standards which have greatly benefited the national economy and aided immeasurably in national defense." Senator Flanders declared. "To grant this association a Federal charter will strengthen this valuable work and will place the Congress on record as favoring the development of standards within the free-enterprise system through the cooperative efforts of all parties at interest—including Government.

"The measure will cost the taxpayers nothing. It will save them money."

Senator Flanders speaks for the charter for the American Standards Association with the authority of long acquaintance with both the principle and practice of standardization. As president of Jones & Lamson Company he was concerned with the use of American Standards for screw threads. As a member of the Sectional Committee on Screw Threads for some 20 years and chairman for nearly the entire time, he was active in the development of these American Standards. He was chairman at the first conference with the British and Canadians in 1943 at which postwar negotiations for unification of screw threads were taken up.

The text of the bill is given in full below:

A BILL

To incorporate the American Standards Association.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That recognizing an increasing need of standards to facilitate the operation of commerce and industry and the functioning of government, and to promote the public welfare, it is hereby declared to be the policy of Congress to encourage the voluntary development and use of technical and commercial standards representing a national consensus of all parties directly interested, such as is brought about through the procedures of the American Standards Association, incorporated herein, so as to unify the standards and specifications of both Government and industry and increase the flow of goods in interstate and foreign commerce.

TITLE I

SEC. 2. The following persons, to wit: Thomas D. Jolly, 113 Jefferson Drive, Mount Lebanon, Pennsylvania; Harold S. Osborne, 379 Highland Avenue, Upper Montclair, New Jersey; Donald Armstrong, Cottage and Cliff Avenues, Edgewater Park, New Jersey; Robert I. Catlin, 41 Bishop Road, West Hartford 7, Connecticut; Clarence L. Collens, 2544 Wellington Road, Cleveland 18, Ohio; Howard Coonley, 241 East Sixty-first Street, New York, New York; E. H. Eacker, 22 Conant Road, Weston 93, Massachusetts; R. E. Gay, 134 Summer Street, Bristol, Connecticut; R. Oakley Kennedy, 270 Park Avenue, New York 17, New York; Frederick R. Lack, Ridgefield, Connecticut; J. H. McElhinney, Leatherwood Lane, Wheeling, West Virginia; Carol Wills Moffett (Mrs. Guy), 6617 Popular Avenue, Tacoma Park, Maryland; Curtis W. Pierce, 11 Marion Road, Upper Montclair, New Jersey; Robert A. Seidel, 10 Avon Road, Larchmont, New York; John R. Suman, 984 Kirby Drive, Houston 6, Texas; W. C. Wagner, 149 Grand View Avenue, Ardmore, Pennsylvania; being persons who are now directors of the American Standards Association, Incorporated, a membership Association incorporated under the laws of the State of New York; and their associates and successors duly chosen, are hereby created and declared to be a body corporate by the name of "American Standards Association".

SEC. 3. The duration of the corporation shall be perpetual.

SEC. 4. The objects and purposes of the corporation shall be to operate exclusively as a nonprofit educational and scientific organization, and, in connection therewith, to assemble and diffuse knowledge concerning the standardization of measurements, materials, products, methods, operations, and nomenclature; to study, approve, and promote the use of suitable and desirable standards; to provide systematic means by which organizations concerned with standardization work may cooperate in creating and developing such standards so that they may represent a consensus of those concerned with their scope and provisions; to furnish facilities for promoting the use of such standards; to serve as a clearing house for information on standardization work in the United States and foreign countries; and to cooperate with the Government of the United States, and with other organizations, in standardization matters, including cooperation in international standardization matters.

SEC. 5. The corporation shall have power—

(a) to have succession by its corporate name;

(b) to sue and be sued, complain and defend in any court of competent jurisdiction;

(c) to adopt, use, and alter a corporate seal;

(d) to choose such officers, directors, managers, and agents as the business of the corporation shall require;

(e) to ordain and establish by laws and procedures, not inconsistent with the laws of the United States of America or any State in which the corporation transacts business, for the management of its property and the regulation of its affairs. The procedures shall assure reasonable provision for participation in the development of a standard by representatives of all parties at interest, or, in the case of a standard developed before submission to the corporation, for an opportunity for such representatives to present their views on the standard, which views shall be considered in the reviewing process prior to the approval of the standard as an American Standard; and no standard shall be approved as an American Standard unless there is shown to be a consensus in its favor affirmatively expressed. In addition to such other matters as may be deemed useful in the operation of the corporation, the bylaws may provide for, subject to the provisions of section 7 of

this Act, the qualification, admission, classification, fees, dues, privileges, and withdrawal of members; for the number, qualification, term of office, powers, and removal of the directors; and the classification of directors into classes so that the term of directors of one class shall expire each year, and for the powers, duties, compensation and terms of office of its officers. Such bylaws and procedures may be amended or repealed from time to time in the manner therein provided;

(f) to contract and be contracted with;

(g) to take and hold by lease, gift, purchase, grant, devise, or bequest any property, real or personal, necessary in attaining the objects and carrying into effect the purposes of the corporation, and to manage such property and apply it and the income therefrom to its corporate purposes, subject, however, to applicable provisions of law of any State (1) governing the amount or kind of real or personal property which may be held by, or (2) otherwise limiting or controlling the ownership of real personal property by a corporation operating in such State;

(h) to transfer and convey real or personal property;

(i) to borrow money for the purposes of the corporation, and issue bonds therefor and secure same by mortgage subject in every case to all applicable provisions of Federal or State law;

(j) to obtain and hold copyrights, trade-marks, and similar property for attaining the objects and carrying into effect the purposes of the corporation;

(k) to have the sole and exclusive right to use, and to authorize the use of, the term "American Standard" in connection with the development, use, or promotion of measurements, materials, products, methods, operations, and nomenclature or standards therefor:

Provided, That nothing in this Act shall interfere or conflict with established or vested rights, or be construed so as to prevent the republication of any standard heretofore described or designated by the term "American Standard" but not in a manner calculated or likely to mislead the public into believing that such standard had been approved by the American Standards Association, or to prevent the publication of any revision of such a standard, or to prevent any organization responsible for the publication of any such standard heretofore so described or designated from publishing or causing to be published any new standard in the same field with such designation;

(l) to take and receive on such terms as may be agreed upon by the parties the assets and records of the American Standards Association, Incorporated, a membership Association incorporated under the laws of the State of New York, having its office in the city of New York, and to assume its obligations and perform its pending contracts and commitments; but nothing herein contained shall prejudice any right of any creditor of said unincorporated association against it or its assets;

(m) to do any and all acts and things necessary and proper to carry into effect the objects and purposes of the corporation.

SEC. 6. (a) No part of the income or assets of the corporation shall inure to the benefit of any of its members, directors, or officers, or be distributable thereto, otherwise than upon dissolution or final liquidation of the corporation pursuant to the provisions of section 16 of this Act.

(b) No substantial part of the activities of the corporation shall consist of carrying on propaganda or otherwise attempting to influence legislation.

(c) The corporation, and its officers and directors as such, shall not contribute to or otherwise support or assist any political party or candidate for elective public office.

(d) The corporation shall not have or issue shares of stock nor declare or pay dividends.

(e) No loans shall be made by the corporation to its officers or directors, or any of them, and any directors of the corporation who vote for or assent to the making of a loan or advance to an officer or director of the corporation, and any officer or officers participating in the making of any such loan or advance, shall be jointly and severally liable to the corporation, for the amount of such loan until the repayment thereof.

(f) The corporation shall be liable for the acts of its directors, officers, and agents when acting within the scope of their authority.

SEC. 7. (a) Associations, Government agencies and authorities, public and private corporations, partnerships, and individuals shall be eligible for membership in the corporation.

(b) Membership in the corporation shall be divided into—

(1) member-bodies; and

(2) such other classes of members, having no right to vote or otherwise participate in the management of the corporation, as the bylaws may provide.

(c) Member-bodies shall be departments and agencies of the Government of the United States and organizations or groups of organizations of national scope which shall be functioning, responsible units, recognized in their respective spheres of activity.

(d) Departments and agencies of the United States Government are hereby authorized to accept membership in the American Standards Association as member bodies; *Provided*, That such departments and agencies shall not be required to pay any dues or fees in connection with such membership: *Provided further*, That such membership shall not entail any financial or legal liability on the part of such departments and agencies, or the representatives thereof, nor shall it vest any right to a share in the distribution of assets in the event of liquidation.

(e) The heads of departments and agencies of the United States Government are hereby authorized to designate representatives of their departments and agencies to serve on the Standards Council, or, upon election or appointment, on the Board of Directors, or any committee of the American Standards Association, and such representatives so designated are hereby authorized to serve, and to represent the department or agency concerned, on such board, council, or committee of the American Standards Association.

(f) The ultimate general authority and responsibility for the policies and affairs of the corporation shall be vested in the member-bodies.

(g) Subject to the provisions of paragraph (f) hereof, nonvoting members shall possess such rights and privileges as shall be set forth in the bylaws.

(h) Subject to the provisions of paragraph (f) hereof, persons, associations and corporations not members of the corporation shall possess such rights and privileges as shall be set forth in the Bylaws.

SEC. 8. The board of directors of the corporation shall consist at first, and until their successors are elected, of the persons named in section 2 of this Act. The first meeting of said board of directors shall be held pursuant to call therefor, and notice thereof, signed by a majority of the said directors, copy of which shall be mailed to each of the directors at least twenty days before the date of the meeting; and said meeting may be adjourned from time to time until its business is completed. The said board of directors shall at such meeting, by the affirmative vote of at least a majority thereof, adopt bylaws which shall govern the exercise of the corporate powers and privileges conferred upon and granted to the corporation.

SEC. 9. The executive, financial, and general administrative functions of the corporation shall be vested in a board of directors. Members of the board shall be elected by the member bodies, each of said member bodies having the right to one vote for each director.

SEC. 10. The officers of the corporation shall be a president, one or more vice presidents, a secretary, and such other officers as may be provided in the bylaws. The officers of the corporation shall be elected by the board of directors.

SEC. 11. The principal office of the corporation shall be located in the city of New York, New York: *Provided*, That such location may be changed to any other city of the United States by a two-thirds vote of the member bodies. The activities of the corporation may be conducted throughout the various States, Territories, and possessions of the United States and in foreign countries.

SEC. 12. Nothing in this Act shall be so construed as to modify in any way the authority of any department or agency of the United States Government to develop, adopt, or promulgate standards; or to participate in the standardization activities of organizations other than the American Standards Association.

SEC. 13. The corporation shall keep correct and complete books and records of account and shall also keep minutes of the proceedings of its board of directors, and committees having any of the authority of the board of directors, and of its membership meetings; and shall keep at its princi-

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Limits and Fits—*A Fundamental Problem*

by W. H. Gourlie

LAST Spring, when it had been decided to have an American delegation attend the conference on screw threads, to be held in Paris under the auspices of the International Organization for Standardization (ISO), it was considered desirable to have the members of the delegation attend also, as observers, the conference of the ISO Technical Committee on Limits and Fits. Both conferences were being held in Paris within a few days of each other. This arrangement was both fitting and opportune as active American participation in the ISO project. Limits and Fits, was—and still is—under consideration by ASA section committee B4 dealing with this subject. The thought was that observation at close range of the ISO committee at work in Paris might be helpful in reaching a decision as to our participation. Accordingly, five members of the American delegation, at the cordial invitation of the French secretariat, sat in with the official delegations from the participating countries. The American members did not vote, but did take an active part in the discussions.

A brief review of the highlights of the development of standardization of Limits and Fits in the United States and abroad, together with the present status of the ASA project, will be helpful in evaluating the discussions at Paris.

Some 25 years ago, an ASA committee developed the American Tentative Standard Tolerances, Allowances, and Gages for Metal Fits, B4a-1925.[1] This contained tables listing eight series of fits between holes and shafts, each fit being specified by the limits of size for each of the two mating parts. The British adopted in 1924 a comparable standard, which was a revision of one approved in 1904. On the European Continent, several countries, including Germany, Sweden, and Switzerland, had set up similar national standards in metric units. All of these standards listed completely specified fits.

In 1926, the International Standards Association, or ISA, was organized, and one of the earliest projects, assigned to an ISA technical committee, was the development of an international system of Limits and Fits. This committee's work was published in 1941 in ISA Bulletin No. 25, entitled "ISA Tolerance System." Many countries on the Continent adopted this system as the basis for their national standards, even before World War II. All data were given in metric units. It had been the desire of the ISA committee to make the tolerance system very comprehensive. Therefore, the many grades of tolerances and allowances were associated with preferred diameters in tables of fits which embraced a range of applications sufficient to cover the needs of widely varied types of industries. The result was such an elaborate set-up that in the United States the ISA System was generally regarded as overly complicated. This opinion resulted after careful study, for which ISA Bulletin No. 25 was reproduced in inch units for better understanding by American experts.

The American Tentative Standard has been under revision for several years. The work so far completed has been approved and published as Part I of a new American Standard, Limits and Fits for Engineering and Manufacturing. This comprises definitions of terms, tables of preferred basic sizes, and recommended values for tolerances and allowances. Development of Part II is proceeding in accordance with a well defined program.

At the time that efforts toward the unification of American and British screw threads were taken up again actively, consideration also was given to the possibility of developing a uniform standard for Limits and Fits for the United States, the United Kingdom, and Canada. The former two countries were investigating their standards for possible revision, so that the time was opportune for considering unification. At the Ottawa Conference in 1945 and shortly afterwards, delegates from the three countries reached agreement on many of the data now covered by Part I of the new American Standard.

The ASA committee has given a great deal of consideration to the problem of developing new tables of recommended fits. Such tables, if they are to be used correctly and expeditiously, must be based on uniform grades of work, or intended for similar types of application, or both. As a first step, the ASA committee is studying the practicability of developing a series of tables for holes with tolerances increasing progressively in accordance with normal machining methods and practices. Concurrently, it is intended to carry out a thorough study of practices in American industry, with a view to determining the relative importance of each of the many factors which exert a major influence on a fit. Among such factors are the materials of the mating parts, hardness, surface finish, length of bearing, load, speed of rotation, lubrication, and so on. Some progress in the collection of these data has been made, but considerably more work is ahead. It is expected that it will be some time before Part II can be published.

Discussions with British engineers early this summer disclosed that similar problems are now confronting them. Dr Rolt of the National Phys-

[1] *Sponsored by the American Society of Mechanical Engineers.*

W. H. Gourlie, Standards Engineer of the Sheffield Corporation, who sat in on the meeting of the ISO committee on Limits and Fits as one of the American nonvoting representatives, reports here that he found this country's problems paralleled in other countries. In his opinion, active American participation in the work of this committee would best serve the interests of American industry.

Mr Gourlie has taken an active part for many years in standardization work on screw threads, pipe threads, and on limits and fits under the procedure of the American Standards Association, and also in the work of the American Gage Design Committee. He is well qualified for this since his regular duties are concerned with the manufacture and distribution of gages, gaging instruments, and tools for use in production to those standards.

In related fields, he is a charter member of the Hartford Chapter, American Society of Tool Engineers, and a charter member of the Hartford Society for Measurement and Control which is affiliated with the American Society of Quality Control.

ical Laboratory, who is also chairman of the British Committee on Limits and Fits, stressed the need of including in any standard—national, unified, or international—a section which would serve as a key to its use. Such a section would seek to enable the user to isolate and evaluate the factors determining his requirement and perhaps guide him in his choice of machining methods to produce parts within permissible limits and with the required finish. Development of such a section necessitates the collection, sorting, and codification of a tremendous amount of data. Not only must blueprints and printed data be covered completely, it is equally important to know the unwritten and common practices. It is a long-range program.

At the ISO Paris Conference the very same question came up again. Should an international system be restricted to preferred basic sizes and recommended values for tolerances or allowances? Or should it go beyond this and include tables of fits? If so, from what basis should the tables be constructed? Delegates from several countries urged that tables of fits be included. A number of the delegates to the Paris conference had taken an active part in the development of the ISA Tolerance System and having successfully introduced parts of it as their national standards, they attached considerable importance to it. It should be mentioned that all such countries use the metric system and that ISA Bulletin No. 25 as published has values in metric units. It was voted at Paris, therefore, to have this ISA Bulletin serve as a basis for the work of the new ISO committee. Another decision reached was to extend the scope of the work to sizes below 1 mm and above 500 mm, the extreme sizes of the range covered by ISA Bulletin No. 25. Furthermore, so rapid has been the development of instruments for the accurate and rapid dimensional inspection of components, that the section on gaging in ISA Bulletin No. 25 calls for revision. Close cooperation with ISO technical committee 57, on Surface Finish, was deemed essential in view of the direct relationship, both in scope and application of the two projects.

The British delegates distributed, for the information of the delegates, copies of a proposed revision of their national standard, Limits and Fits for General Engineering. Amplifying this

—A. Devaney, Inc, N. Y.

One of the most important fits is that between cylindrical parts.

document, Dr Rolt made a strong plea for the development of an adequate guide, illustrated by practical examples, that would assist the engineer in selecting the basic size, and the allowance and tole.ances, determining the fit between two mating parts, best suited to his particular problem. This plea was in harmony with the opinion of the ASA Committee on this subject and appealed also to a majority of the delegates from other countries. Accordingly, a resolution was adopted to include the development of a guide as suggested, in the program of work. This guide is intended to promote the use of the system, as well as "to facilitate the choice of tolerances, clearances and interferences, most suitable from the technical as well as the economic point of view."

To assist the secretariat in carrying out the preliminary work and in the development of a proposal, an ISO subcommittee was appointed. Belgium, Czechoslovakia, France, The Netherlands, Poland, Sweden, Switzerland, and the United Kingdom volunteered for active membership on this subcommittee. The American delegates offered to assist by supplying technical information that might be requested and would be available in the ASA committee.

It is worthy of mention here that unanimous agreement was reached promptly on the affirmation of the temperature, 68 F or 20 C, as the international reference temperature for limit gages and industrial length measurements. International agreement on this point had been reached under the former ISA and the temperature of 68 F has truly become a world standard adopted by all industrial countries.

Throughout all of the international discussions, we observed how closely our basic problems parallel those of other countries. Therefore, pooling of our efforts to solve these problems can be helpful. We believe that the interests of American industry, repre-

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What Can Be Done Toward

by George S. Case

SEVERAL years ago, Senator Flanders, then chairman of the ASA committee on Screw Threads, wrote: "The screw thread is a simple device, but it ties together the whole mechanical skeleton of our civilization."

Efforts toward the establishment of screw thread standards, so as to secure interchangeability of threads and satisfactory fits between assembled parts, started more than a century ago. In England, Joseph Whitworth proposed in 1841 a thread system having a basic form with a 55-degree angle and rounded crest and root. With this form applied to specific diameter-pitch combinations, the Whitworth system became widely adopted, not only in the British industry, but also on the Continent of Europe. In fact, when national standards bodies were organized, first in Great Britain and after the first World War, in twenty-odd Continental countries, they adopted Whitworth threads as national standards. France alone recognized metric threads exclusively.

In the United States, William Sellers proposed a thread system in 1864. This was largely patterned along the lines of the Whitworth system, but had a different profile. Its thread angle was 60 degrees and its crest and root were flat. With a few minor modifications, the Sellers system ultimately came to be recommended for general use by the National Screw Thread Commission in its report of 1920, and since 1924, as an American Standard approved by the ASA. Many diameter-pitch combinations of the coarse thread series were the same as those in the British Standard Whitworth system. In such cases, American and British threaded parts usually could be assembled with acceptable fits, in spite of the difference in thread angle. However, some diameter-pitch combinations in the coarse thread series were different, in the two systems, thus making assembly of American and British parts impossible. The most disturbing among these cases was the widely used ½-inch coarse thread, for which the British had 12, and the Americans, 13 threads per inch. Moreover, all American and British fine threads were non-interchangeable.

Efforts toward the unification of the American and British Standards were made in 1919 and 1926, without success. Particularly, the ½-inch coarse thread proved to be a stumbling block and the thread angle of 57½ degrees proposed by the British as a compromise, did not appeal to either side. American production of war equipment for the British during World War II made the need for unification acute again and conferences between American, British, and Canadian experts held in New York, London, and Ottawa during the years 1943 to 1945 brought about agreement on a unified system having a basic thread form with a 60-degree angle and a curved root contour. The crest of the screw may either be flat, as preferred in American practice, or round, as favored by the British. A compromise was reached on diameter-pitch combinations, particularly the ½-inch coarse, and the 1-inch fine threads. This unification was featured by an official ceremony in Washington in November, 1948; and in 1949, the U.S., the U.K. and Canada formally approved and published their national standards incorporating the Unified Screw Thread system.

In Continental Europe, attempts to establish a metric standard thread system also started in the middle of the 19th century. In 1898 the so-called International, or SI, System, was established at a congress held in Zurich, Switzerland. The U.S., and Great Britain were invited, but did not participate. The SI thread form had a 60-degree angle and a flat crest and root. It was similar to the American National Standard form, but the truncation was 1/16 of the height of the fundamental triangle, instead of ⅛, as in the American profile. The SI System, entirely metric, became generally introduced in Continental Europe for coarse threads in nominal diameters from 6 to 80 millimeters, inclusive (about ¼ to 3¼ inch), together with national standards for Whitworth threads, expressed in metric units, but interchangeable with the British Standard threads. As stated before, France was the only country that recognized only the metric thread as the national standard. Extensions of the metric coarse series for diameters below 6 mm and above 80 mm, and supplementary fine thread series, were adopted in several countries. However, these developments, embodied into various national standards, showed a number of differences and, therefore, did not secure complete international interchangeability. Under the procedure of the International Standards Association, or ISA, founded in 1926, five metric thread series were recommended for international adoption and published in ISA Bulletin No. 26, September, 1940. Also, a basic thread form, similar to the SI profile of 1898, was recommended by the ISA committee on Screw Threads in 1939. It had a round root and showed great resemblance with the profile now adopted for the Unified Screw Thread system.

During World War II the ISA was abolished. Its work has been continued by a new body, the International Organization for Standardization, or ISO. The secretariat of the ISO technical committee on Screw Threads was assigned to the Swedish Standards Association, which developed a proposed "world system" of screw threads, intended as a compromise between the existing inch and metric thread systems. This proposal, and similar ones submitted by other member-countries of the ISO, were circulated by the Swedish secretariat to the countries participating in the ISO project. The American Standards Association referred these proposals to the ASA committee on Screw Threads, sponsored by the American Society of Mechanical Engineers and the Society of Automotive Engineers. The committee decided that American industry should take an active part in the work of the ISO committee and that it should be represented at the

George S. Case, chairman of the Board of the Lamson & Sessions Company, started as an engineer with the company in 1904, just in time to get in on relatively early work on thread standards. He has worked with SAE standardization committees since as early as 1910. Following World War II, he has been active in the unification work on screw threads and has made several trips abroad in its behalf. He says: "Standardization is particularly vital to the bolt, nut, and screw industry with its production of many millions of threaded parts daily. These parts are so completely standardized that the question is never raised whether the product of one manufacturer will fit the product of another."

World Unification of Screw Threads?

At the ISO screw thread conference, Paris—(Left to right) General Pierre Nicolau, France; M. LeBourhis, France; John Gaillard, USA; George S. Case, USA; H. E. Glahn, Denmark; (back to camera) Kaare Heiberg, Norway.

conference to be held in Paris, in June, 1919, during the first Plenary Assembly of the ISO. Accordingly, copies of the new American Standard for Unified and American Screw Threads for Screws, Bolts, Nuts and Other Threaded Parts, B1.1-1949, were sent, with an explanation of its status, to all participating ISO member-countries and a delegation of five U. S. representatives was appointed to attend the Paris meetings, as follows: George S. Case, Chairman of the Board, Lamson and Sessions Company, chairman; Irvin H. Fullmer, Senior Physicist, National Bureau of Standards; W. H. Gourlie, Standards Engineer, The Sheffield Corporation; Russell F. Holmes, A. C. Spark Plug Division, General Motors Corporation; and John Gaillard, Mechanical Engineer, ASA staff, technical secretary. This delegation was instructed by the ASA committee on Screw Threads "to offer and support, to the extent of consistency with their best judgment, the adoption of the principles of the Unified Screw Thread standards upon which accord has already been achieved between Great Britain, Canada and the United States." The British and Canadian national standards bodies also were represented at Paris, together with 15 metric countries.

At the Paris conference, the Swedish secretariat explained, with the aid of diagrams, the general set-up of the various compromise proposals submitted. This review led directly to a question, addressed to the "inch" countries, whether, as a matter of principle, they would be in a position to consider the adoption of a compromise thread system in case the ISO committee should recommend such a system for general international use. The "inch" countries made it clear that being in a state of transition to the Unified System, on which they had just reached final agreement, and British industry particularly having to make a considerable change, the adoption of still another system, even for the sake of attaining general international uniformity, did not appear to be practicable to them, at this time. The delegations of the metric countries then came to the conclusion that since the inch countries had finalized the unification of their own systems, the immediate problem before the ISO committee was the development of a unified system of metric threads. Under these conditions, the Swedish secretariat withdrew its compromise proposal as having no longer any practical value.

The "inch" countries offered to give the other ISO member-bodies such technical assistance as might be helpful in the development of their metric threads. In this connection they proposed that the basic form of thread, adopted for the Unified System, be considered also as the basic profile for metric threads to be developed. This proposal was approved by a very large majority of the countries represented, for all threads having a pitch of one millimeter (about 0.04 inch) or larger. Thirteen of the fifteen countries represented at the conference voted in the affirmative. France approved the proposal with two reservations, one being that the profile be accepted as a worldwide profile, and the other, that the thread overlap be found satisfactory also for large diameters and fine pitches when adequate thread tolerances are applied. Italy approved the profile of the Unified Thread system only for inch threads. The USSR voted in the negative, preferring the ISA profile of 1939.

The ISO committee decided to designate the Unified Thread profile officially as the "ISO Basic Profile" and approved a drawing prepared during the conference, showing the profile, together with the maximum permissible material forms of the external and internal threads.

Upon the suggestion made by the inch countries that a statement of the scope of the ISO project on Screw Threads be formulated, a subcommittee of six countries, including the U. S., was appointed to draft a scope. The subcommittee met and recommended the following scope which was unanimously approved by the full committee.

> "The establishment of series of internationally interchangeable screw threads covering the technical requirements in various fields of application with a minimum variety of basic profiles, pitches and diameters. The unification of American and British pipe threads is not included in this scope."

This wording leaves the door open for recognition by the ISO committee of thread systems in inch units, as well as in metric units. In fact, it seems conceivable that those metric countries which, in addition to their metric threads, have adopted Whitworth threads as a national standard, may find it to their advantage to change from the Whitworth system to the Unified Thread system. In so doing, they would establish uniformity, not only with British practice (which uniformity they have had for a long time), but also with American practice, a condition which has never existed before. This change would not

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American and Foreign Ball

Courtesy Timken Tapered Roller Bearings

THERE are two major groups of ball and roller bearings, sometimes collectively designated as antifriction bearings. One group comprises ball bearings and bearings with cylindrical rollers, many of the latter being interchangeable with ball bearings. The other group comprises bearings with tapered rollers.

The manufacture of ball bearings originated on the Continent of Europe and has been from its origin in metric dimensions. Thirty years ago some series of ball bearings, then designated as light, medium, and heavy, had practically become standardized as to dimensions, the metric sizes being followed in the United States as well as in Europe.

Tapered roller bearings were originally developed in the United States and their dimensions have been, from the beginning, expressed in inch units.

Efforts toward international unification of the dimensions of ball and roller bearings started on the European Continent in the early twenties as a result of the organization, after World War I, of national standards bodies in various countries. This movement also led to the organization, in 1920, of a sectional committee on ball and roller bearings, under the procedure of the ASA, then still called the American Engineering Standards Committee. This sectional committee was jointly sponsored by the American Society of Mechanical Engineers and the Society of Automotive Engineers.

When in 1926 the International Standards Association (ISA) was founded, one of the first subjects for which a technical committee was organized under its procedure was ball and roller bearings. The secretariat of this international committee was assigned to the Swedish Standards Association, which in 1928 circulated a proposed layout of boundary dimensions for radial bearings, submitted for consideration as standard dimensions to be followed by all countries. The proposed standard series included tabulated dimensions of the inside diameter, outside diameter, and width based on bearings actually in production at that time. The purpose of the layout was to reach advance agreement on the three main dimensions, not only of existing bearings, but also of new ones that might be added to the various series, so that these new bearings also would be internationally interchangeable from the outset.

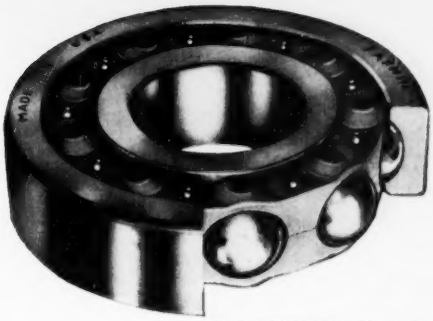
The proposed ISA "Plan of Boundary Dimensions" was discussed at a number of meetings of the ISA committee held during the thirties. As a result of these discussions, changes and additions were made in the original plan. American industry was represented at several of these meetings. ASA Committee B3, on Ball and Roller Bearings, became inactive in 1932 and the contributions made to the work of the ISA committee were, therefore, based mainly on the attitude of the Anti-Friction Bearing Manufacturers Association organized in 1933. In the standardization work of this trade association, the ISA plan of boundary dimensions for radial bearings proposed by the ISA was generally followed, at least in so far as ball bearings, and bearings with cylindrical rollers, were concerned. However, the metric dimensions for tapered roller bearings proposed in the ISA plan were not acceptable to American industry. In developing these dimensions, the Continental industry in Europe had striven for dimensional interchangeability between ball bearings and tapered roller bearings so that the tools and gages used in the production and inspection of bearings and their housings might be held to a minimum. In the United States, the dimensions of ball bearings and those of tapered roller bearings have been developed independently and are not interchangeable. At several meetings of the ISA technical committee held in Europe in the thirties, efforts were made to get consideration for the inch dimensions for tapered roller bearings as used in the United States and in many other countries to which this American product is exported. However, these efforts were unsuccesful. The last meeting of the ISA committee was held in Helsinki in 1939, the ISA being abolished during World War II.

During the war years the Swedish secretariat developed the proposed ISA layout further. This resulted in a very complete proposal dated 1945. When, after World War II, international cooperation in standardization was resumed under the procedure of the International Organization for Standardization (ISO), the work of the old committee ISA 4 was taken over by the new committee ISO 4, with the Swedish Standards Association again in charge of

F. Leister, vice-president in charge of engineering, the Fafnir Bearing Company, has long been active in ball bearing standardization through industry committees, working with the Anti-Friction Bearing Manufacturers Association, the Annular Bearing Engineers Committee, and recently on the ISO committee as a representative of the American Standards Association. He considers that his activity in standardization is the greatest contribution he has made in his work.

Standards for and Roller Bearings

by Fayette Leister
and
R. M. Riblet



Courtesy Fafnir Bearing Company

the secretariat. The Swedish body, in an effort to re-activate the work, circulated the 1945 layout to the member bodies of the ISO, including the American Standards Association. After World War II, ASA Sectional Committee B3, on Ball and Roller Bearings, had been reorganized and a new project, Numbering System for Anti-Friction Bearings, B54, initiated, and the ISO proposal of 1945 was submitted to the reorganized sectional committee for its consideration, together with a 1949 supplement received from the Swedish Association. Accompanying this material was an announcement that a meeting of the ISO committee was scheduled to be held in Paris in June of this year.

The ISO plan was considered in the Spring of 1949 by a special subcommittee appointed by ASA Committee B3, which worked in close cooperation with the Engineering Committees of the Anti-Friction Bearing Manufacturers Association. As a result, comments on the proposed ISO plan were sent to all of the participating ISO members prior to the Paris meeting, together with a report of the status of the ASA work on standardization of ball and roller bearings. The ASA was able to report that a proposed American Standard for dimensions of ball bearings, cylindrical roller bearings, and tapered roller bearings, accepted by the AFBMA, was expected to be approved very soon by ASA Committee B3 and hence, was likely to become an American Standard in the near future. Copies of this draft were sent to all participating ISO countries. Similarly, the ASA committee commented on other proposals submitted by ISO member-countries for consideration at the Paris conference, such as a series of miniature bearings proposed by the Swiss.

The ASA committee further decided that American industry should take an active part in the ISO work through the channels of the ASA and that a delegation should attend the Paris meetings. The ASA accordingly appointed the following delegates: A. L. Bergstrom, Vice-President in Charge of Engineering, Timken Roller Bearings Company; Fayette Leister, Vice-President in Charge of Engineering, The Fafnir Bearing Company; R. M. Riblet, Chief Engineer, Automotive Division, Timken Roller Bearing Company; and John Gaillard, Mechanical Engineer, ASA Staff.

At the Paris meetings held on June 27 and 28, 1949, the ISO plan and other proposals received from member-countries, were discussed. Since no scope of the work of the ISO committee had as yet been formulated, it was decided that a subcommittee should be appointed to take care of this and report at the next meeting of the ISO committee. The countries represented on this subcommittee are Sweden, Switzerland, United Kingdom, and United States, with Switzerland in charge of the secretariat.

The time available at the Paris conference was far too short for taking final action on detail questions. Therefore, it was decided that the ISO Subcommittee on Scope would also review the proposals before the full committee, except those related to tapered roller bearings, and submit new proposals at the next conference.

In regard to tapered roller bearings, the American delegation explained again that the metric boundary dimensions, proposed for tapered roller bearings in the ISO proposal, were entirely unacceptable. The putting into practice of such a proposal by American industry would mean the manufacture of a separate line of metric bearings, in addition to the widely introduced inch sizes, which obviously would be uneconomical. Therefore, the American delegation suggested that the dimensions adopted by the Anti-Friction Bearing Manufacturers Association and now under consideration as American Standard, be considered also for adoption by the ISO as recommended international sizes. These dimensions are those of tapered roller bearings actually in production in the United States, a more weighty factor than a proposed layout of dimensions that, so far as American industry is concerned, are merely theoretical.

It was not possible to reach agreement on this point at the Paris meeting, since the Swedish delegation was very keen to adhere to the metric proposal (already adopted in practice in their country) and France favored metric dimensions, in principle. On the other hand, the United Kingdom supported the viewpoint of the United States.

Upon suggestion by the United States, it was decided that a second ISO subcommittee should be ap-

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R. M. Riblet, chief engineer of the Automotive Division, The Timken Roller Bearing Company, is closely in touch with the work being done in the United States on American Standards for ball and roller bearings. He is an alternate member of the Sectional Committee on Ball and Roller Bearings, representing the Anti-Friction Bearing Manufacturers Association. This committee is sponsored by the American Society of Mechanical Engineers and the Society of Automotive Engineers, under the procedure of the American Standards Association.

Some Highlights of an International Meeting

Compressed gas industry executive comments on his experiences in work with an ISO committee.

by F. R. Fetherston

LONG before the first World War, the compressed gas industry realized that some degree of standardization would be necessary because of the variety of outlets on valves for compressed gas cylinders then in use. As I recall there were some 12 or 15 different outlets used for hydrogen, and an equal number in industrial service for other compressed gases. The industry decided to do something about this and made its first active efforts in the early 1920's. Although both industry and government tried their best to bring about some degree of standardization, it was not until the second World War that any real progress was made.

In 1945, when the Canadian, British, and American Standards organizations met at Ottawa, this subject came up for consideration on an international basis. By that time the Compressed Gas Association was prepared to make a preliminary report on the progress made as a result of work done during the war and in the early months thereafter.

Following the war, and after formation of the International Organization for Standardization, an ISO technical project was set up which included a study of compressed gas cylinder valves. The secretariat was given to the British Standards Institution, and the various members of ISO were asked whether they were interested and willing to participate. Among the organizations in this country to which the request was circularized by the American Standards Association was the Compressed Gas Association, Inc. This Association agreed to participate, and took action to accelerate its work on the standardization of valve outlet threads in the hope of concluding standards for the United States and Canada as soon as possible.

The Association's efforts brought to conclusion the standards that were transmitted to the American Standards Association and which received approval as an American Standard,* incidentally, within a few days of the meeting of the ISO Committee on Gas Cylinders, ISO/TC/58, held in London last April.

Simultaneously with the development of this work in the United States, the Canadian Division of the Compressed Gas Association submitted proposed standards to the Canadian Standards Association. As a result the same standards have now been accepted by both the American Standards Association and the Canadian Standards Association, with the result that there is now virtual agreement on the North American Continent on valve outlet thread standards.

When an announcement was received that a meeting of ISO/TC/58 would be held in London in April of this year, there was little hope given to the possibility that American and Canadian interests might participate. However, the compressed gas industry, on the recommendation of the Compressed Gas Association, decided to arrange for representation, and the Association financed the team that went to London, representing both the American Standards Association and the Canadian Standards Association.

The meeting in London was well attended. The participating countries present were Australia, Belgium, Canada, France, Hungary, India, Italy, The Netherlands, New Zealand, Norway, South Africa, Sweden, United Kingdom, and the United States.

* American Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections, B57-1949.

All agreed that the work of committee ISO/TC/58 will be valuable and that its completion is urgent because of the extent of trade in gas cylinders between these countries. It was also decided to limit the committee's consideration of compressed gas cylinders to containers of 1,000 lb water capacity and less. This agrees with usage in this country, as the maximum cylinder capacity now authorized is 1,000 lb water capacity.

The committee agreed not to give any consideration at this meeting to acetylene other than identification markings on the containers. Other questions were deferred until a later meeting.

The committee did, however, agree to consider a wide variety of cylinder features, including identification of cylinder content; filling pressures for non-liquefied gases; requirements relating to the transportation of containers; gas cylinder valves and fittings; outlet dimensions; inlet dimensions; neck ring standards; cylinder caps; safety devices; antirolling bands, and foot rings. Specifications for compressed gas cylinders that will be considered at some future time include materials of construction; general design features; and requirements for methods of manufacture, such as welded and brazed construction and drawn construction. It was also decided to include inspection and testing, marking, and requirements relating generally to the maintenance of cylinders. Of course, most of this work was deferred for consideration at a subsequent meeting.

One specific agreement was reached at the meeting. This was a definition of a permanent gas. As defined by the ISO committee, a permanent gas is one which has a critical temperature below OC (32F) and which is, therefore, incapable of existing in the liquid state above that temperature.

On the question of proper definition and use of the term "working pressures" there is as much disagreement internationally as there is in our own country. In the compressed gas industry in this country we have two methods of expressing such pressures: First, there is the Interstate Commerce Commission term "service pressure" which is applied to gas

Franklin R. Fetherston, secretary-treasurer of the Compressed Gas Association, Inc. and vice-president of the Liquefied Petroleum Gas Association, Inc. in charge of its technical work, has been associated with the compressed gas industries since 1927. He received his education in engineering at the Carnegie Institute of Technology, and the first several years of his industrial experience was devoted to the field of engineering. During World War I he was a field artillery officer and served on the staff of the Assistant Chief of Staff for Materiel during World War II.

cylinders; then there is the term generally associated with the Unfired Pressure Vessel Codes of the American Petroleum Institute and the American Society of Mechanical Engineers. The ICC service pressure is not a function of design but is an arbitrary marking placed on the container which establishes limits beyond which pressures may not be developed in the container.

No conclusion was reached at the London conference on the question of how to describe working pressures but there was unanimity of opinion on the thought that every container should carry on it suitable markings to indicate the maximum filling pressure, as well as the maximum test pressure to which that container can safely be subjected. These markings may be expressed in either of two ways. One way is with a mark, for example, 150/225. The 150 would indicate a maximum filling pressure of 150 kilograms per square meter, and the 225 would indicate a maximum test pressure of 225 kilograms per square meter. Or it may be expressed in terms similar to those used in this country; for example, 1800/3000 psi. would mean a maximum filling pressure within the container of 1800 pounds per square inch, and maximum test pressure of 3000 pounds per square inch. Either one of these markings would be understood in every country represented on the committee.

The problem of the use of colors for identification of cylinder content was considered one of the most important before the committee by the majority of the delegates. This view was not shared by our delegation. At the start of this discussion, the leader of the American delegation proposed a motion that the committee recognize *as the primary method for identification of the cylinder content* the marking of the container with the name of the gas contained in some suitable legible manner. This conforms to our American Standard and practice in our industries. The proposal was agreed upon but the point is not clearly stated in the minutes of the meeting.

Discussion then started on the question of color coding. The American and Canadian delegates did not participate in this discussion since the compressed gas industry in the United States and in Canada does not have color standards. For that reason these delegations preferred not to express an opinion. In addition, the American and Canadian delegation had voted for the generally accepted primary method of marking cylinders and did not want to be recorded on a secondary method, such as the use of colors. It was suggested that the question be referred to a subcommittee. Since the United States and Canada do not have national color standards and are therefore not committed to any system, it was suggested that the secretariat of such a subcommittee be given to the United States. This was done and we accepted the assignment.

Standard Oil Co. (N. J.)

Cylinders being unloaded, to be refilled and reissued.

Since the April meeting, attempts have been made by members of the American delegation to arrange a meeting with government agencies who are interested in using a system of color coding. Industry is not interested in color coding; it has the kind of standard it wants and one that it considers to be adequate. However, it does not close its eyes to the need for a color coding system as a secondary method, especially for the government agencies that seem to want it.

When filling densities for compressed gas cylinders were discussed it was found that a great variety of requirements existed in the several countries represented. However, it seemed to be difficult to get the delegates to consider any system other than their own. Our experience in connection with this discussion demonstrates one of the most important points about international standardization, in my opinion. In spite of the fact that the methods proposed by our delegation were more simple and more direct than any other the meeting gave them no consideration. It is my feeling that our principles were not taken seriously, and only because a few of the nations represented had rules for determination of filling ratios that they were not willing to change. We may as well forget about standardization unless there is a willingness to consider each proposal on its merits.

I consider that Technical Committee ISO/TC/58 is a logical coordinator on matters within its scope. It should obtain from all members pertinent information about rules, regulations, specifications, and practices in the industry within the various countries represented and distribute that data to all paritcipating delegations. Actual standardization on an international basis is certainly well in the future and in my opinion will not be achieved until there is better understanding in each delegation of the practices in all of the other countries and the reasons and conditions that justify such practices. I am hopeful that the committee will approach this problem logically and start by building up the records of each delegation with all available data before it attempts to propose recommendations for unification of practices or standardization of equipment.

10 10.6 11.2 11.8 12.5 13.2 14 15 16 17 18 19 20 21.2 22.4 23.6 25 26.5 28 30

Preferred Numbers —

by John Gaillard

PREFERRED Numbers are numbers adopted as standard values with the intention that designers and standardizers will apply them to dimensions of length, weights, capacity ratings, or other requirements for which numerical values have to be specified. As their name indicates, Preferred Numbers are to be given preference over other numbers in all cases where it is possible to do so from a technical and economic point of view. This recommendation is made with the understanding that in some cases there may be compelling reasons for using other numbers.

In order to present a picture of the American and international developments in this field, it may be well to explain first the set-up of a system of Preferred Numbers. This will be done by reference to the American Standard, Z17.1-1936.

The essential part of this standard is contained in a single table. This gives four series of numbers covering the range from 10 to 100. The simplest of the series is the 5-series, thus designated because its numbers provide five steps between 10 and 100, each having practically the same proportion, 1.6, or in other words, representing an increase of 60 per cent. These numbers are:

10 16 25 40 63 100

The other three series, called the 10-, 20-, and 40-series, similarly cover the range from 10 to 100, by 10, 20, and 40 steps, respectively. Again, in each series the steps between consecutive numbers have a practically constant step-up ratio of 25, 12, and 6 percent, respectively.

Preferred Numbers in any of these four series, but applying to decimal ranges other than from 10 to 100, can be found at once by shifting the decimal point. Thus, the Preferred Numbers in the 5-series, for the range 1 to 10, are 1; 1.6; 2.5; 4.0; 6.3, and 10; and those for the range 100 to 1000, are: 100; 160; 250; 400; 630; and 1000 (see Fig. 1).

The designer or the standardizer is thus provided with four series of numbers, ranging from the infinitely small, to the infinitely large, tuned to the decimal system which is a world language, and giving him a choice of four degrees in fineness of graduation, from which he can choose values to suit the particular problem he has under consideration. This may be the adoption of a dimension of length, a nominal power rating, or a quality characteristic of a material. The recommendation made by the American Standard is that the designer or standardizer use a Preferred Number whenever possible—that is, in any case where there is no good reason to use any other number. The standard also recommends that he try to use the 5-, 10-, 20-, and 10- series, in this order of priority.

As a matter of experience we find that in general the designer, when asked to give consideration to the use of Preferred Numbers, shows a tendency to balk. He has the feeling that the adoption of Preferred Numbers may or will cramp him in his efforts to produce what he believes to be the best design under given conditions. This fear is understandable, since design involves creative ability and the designer of an industrial product has to work anyway with one eye on the practical requirements of manufacturing. However, if he gives the matter further thought, the designer will realize two important facts. First, he has at his disposal a numerical system covering the entire range of dimensions of length, or other characteristics that he may have to express in terms of measurement. Moreover, he can come down to a rather fine graduation in steps of 6 percent, in the 40-series. (Actually, there is even a still finer series, the 80-series, with a 3 percent step-up, but this should be considered as being for exceptional use only. Accordingly it is not listed in Table 1 of the American Standard.) Second, the term "Preferred Numbers" implies that while it is hoped that the designer or standardizer will give them preference, he is not expected to be able to use them exclusively. There even may be cases where he cannot use them because the problem at hand definitely calls for a value not belonging to the series of Preferred Numbers.

Once the designer is satisfied that he will not be handicapped by using Preferred Numbers, he may wonder what good they will do him. The answer is twofold. In the first place, the use of Preferred Numbers, as selected numerical values, in principle benefits the manufacture, operation and servicing of an industrial product, in the same way as does the adoption of standardized component parts. By adopting specific numerical values where he can, and by keeping the variety of these values to a

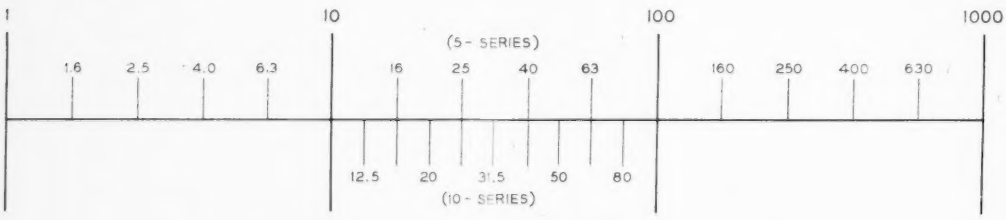


Fig. 1. Showing the 5-series for ranges 1-10, 10-100, and 100-1000; and the 10-series for the range 10-100 only. The 40-series (10-100) is shown in red.

10 10.6 11.2 11.8 12.5 13.2 14 15 16 17 18 19 20 21.2 22.4 23.6 25 26.5 28 30

An International Tool For Standardizers

minimum (by observing the "priority ratings" of the Preferred Numbers series), the designer will work toward economy in manufacture resulting from having fewest different materials, component parts, production tools and inspection gages. A simple example is where the designer has to compute diameters of component parts based on functional requirements. If in all cases, results of computations that lie closely together are rounded to the same Preferred Numbers, this may lead to use of the same bar stock in all cases, as well as the same tools and gages for producing and checking the bores of the components with which the parts must be assembled. Figuratively speaking, most of the dimensions to be specified, and possibly all of them, will thus fall into "storage bins," each labeled with a Preferred Number, and overall diversity in materials, parts, as well as in production and inspection methods, is automatically reduced thereby.

The second advantage of the use of Preferred Numbers to the designer and standardizer is still more important. This advantage lies in the fact that in each series of Preferred Numbers the increase between consecutive members is in the same proportion throughout the series, or in other words, the relative importance of the increase from one number to the next, is the same everywhere.

This property of Preferred Numbers series—which they have in common with all geometric series—enables the designer or standardizer to use Preferred Numbers as a rational basis in establishing numerical values for dimensions, areas, weights, power ratings, or other measurable quality characteristics, to be assigned to a line of products made in different sizes or grades. In general, it is true in human life that a change is most important viewed in proportion to the initial condition. Preferred Numbers spread this importance equally over the range they cover. For example, in the 5-series from 10 to 100, disregarding slight deviations due to rounding, the increase from 10 to 16 at the low end of the range is the same as from 25 to 40 in the middle, and from 63 to 100 at the high end. Compare this with the set-up we would get by dividing the range from 10 to 100 arithmetically into five equal steps, with the resulting values: 10; 28; 46; 64; 82; and 100. We then would have an increase at the low end of 180 percent, tapering down to an increase of about 22 percent at the high end. Let us assume that such a series were applied to capacity ratings of a line of production machines. Obviously, users of machines with the low ratings would be in a much less favorable position, as to flexibility of choice, than would be those using machines at the high end of the range. Ratings chosen in accordance with the 5-series of Preferred Numbers, on the contrary, place all of the user groups on an equal basis.

So far, we have laid the stress on the value of Preferred Numbers to the designer, as well as the standardizer. This has been done to emphasize what the designer can do, in his creative function, to establish a rational basis for standardization. First, he can adopt Preferred Numbers for basic values, such as nominal ratings and overall dimensions, and as the lines of product develop as to types and sizes, he can apply Preferred Numbers increasingly to details. Thus, he will gradually build up a system of harmoniously correlated values that make for maximum economy in production.

The standardizer can use Preferred Numbers also effectively in applying that much-used form of standardization designated as simplification. By this, we understand the adoption of a standard series of items by selecting them from a variety of existing items recognized to be excessive in regard to the range of needs to be covered. Here, we have to deal with dimensions, areas, weights, and so on, that have already been adopted and often are used in current production. The standardizer then has the problem of selecting from the variety only those values that are deemed sufficient to meet the entire range of existing requirements. In so doing, he may hit upon many values that are used in practice, but whose differences are not significant. Which ones should be retained and which ones discarded? There may be no technical advantage to any of the values concerned. The user of each specific value becomes a champion for having it retained in the standard to be. How is the standardizer going to make a reasonable decision? Preferred Numbers will provide him here with a rational guide for selection, based on equal proportional increases. Especially when the existing variety is great, it often is possible to pick a series of values that either are Preferred Numbers, or lie close enough to them, to obtain a rational step-up, without adding any new items. It may be necessary to replace the existing diversity by Preferred Numbers belonging to more than one series, or in other words, the procentual step-up may not be the same throughout the entire series of items adopted as "standard." However, in the course of time, it may appear that some additional values may be discarded. Conversely, in laying out new lines of products,

(*Continued on page 299*)

Dr John Gaillard, mechanical engineer on the staff of the American Standards Association and secretary of the ASA Mechanical Standards Committee, was an associate director of the national standards body in The Netherlands and engaged in time, motion and fatigue study work with Frank B. Gilbreth before coming to the ASA. Since 1947 he has been a lecturer on Industrial Standardization at Columbia University and has held private seminars on the organization and technique of standardization work in an individual company.

How Green the Leaf—How Deep the Root?

by Richard P. White

IF you have bought nursery stock for your home, it might come as a surprise to learn that your shrubs, for example, probably had to meet a grading standard before they were sold. Knowing this, you can surmise that this is done so that buyer and seller can both have an exact idea of the plant size requirements to be filled in their transaction. There are more reasons, however, for grading standards for nursery stock.

"To make buying and selling easier and minimize business misunderstandings; to enable us to grow stock of standard sizes and grades; to insure receiving and delivering stock that will be according to written order, thus protecting both buyer and seller; to print readable and understandable catalogues; and, in general, as an aid to better and more profitable business." This statement by Harlan P. Kelsey of Kelsey-Highlands Nursery, East Boxford, Massachusetts, the chief promoter of standardized plant names, explained to those present at the 1921 Annual Meeting of the American Association of Nurserymen the need for uniform grading standards for nursery stock. Soon after this, Mr Kelsey's Committee on Standardization formulated the first systematic code of standards for nursery stock which, in 1923, was adopted at the Annual Meeting of the Association.

Since that time four revisions of these standards have been made. The last, American Standard for Nursery Stock, Z60.1-1949, completes, for the time being, work that began as early as January 8, 1903.

On that date a Classification Committee of the Ornamental (Plant) Growers Association made a report on the grading of nursery stock of ornamental plants. A further report of a Committee on Grading Ornamental Stock was made to this Association in 1911 at which time a resolution was adopted specifying that ornamental shade trees be graded on a basis of the caliber of the tree trunk and that the measurement of the caliber be taken six inches above the ground.

Nothing further was done about standards until 1918 when the Ornamental Growers Association referred the whole subject of standardization to the American Association of Nurserymen. The record is not entirely clear from this time to 1921, during which year Association President Lloyd C. Stark of Stark Brothers Nurseries and Orchards Company, Louisiana, Missouri, and later Governor of Missouri, appointed Mr Kelsey to investigate the field of standards for the purpose of establishing grades.

The horticultural standards of 1923 included grading tables for deciduous shade trees and fruit trees only. It also attempted standardization of horticultural terms and abbreviations, shipping and trading terms and expressions, and included other material not related to standardization of product but related to standardization of business practices. This material has since been eliminated from the standards.

The first amendments to the 1923 standards were made by the Association in 1930 when grades were established for six different classifications of deciduous shrubs and special grades were adopted for dormant rose bushes. The standards were further revised and extended in 1936.

It was soon proved that the 1936 revision was inadequate to cover all classes of plants grown and sold by the nursery trade in various sections of the country. Moreover, purchases by the governmental agencies demanded more explicit grading standards that would eliminate as far as possible the guesswork in writing and interpreting plant specifications. For these reasons another revision and extension of the standards was completed in 1940.

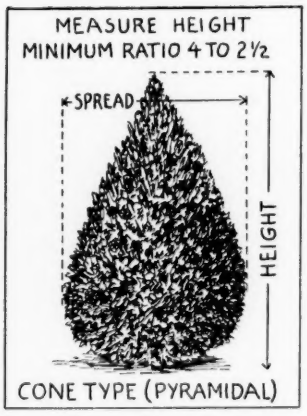
This year the entire standard was recast and further expanded and has now been given the status of American Standard through approval by the American Standards Association. American Standard for Nursery Stock, Z60.1-1949, differs from the previous editions in that grades and standards for one year apple, strawberry plants, and asparagus roots, and a series of line drawings illustrating various measurements referred to in the text are included for the first time. A new format, meeting the specifications of the American Standards Association, has also been used.

At the present time the American Standard for Nursery Stock, Z60.1-1949, represents the best thought of the nursery industry as developed over a long period of years. Within the nursery trade these standards are in general use, and wholesale and most retail catalogues follow the grading standards recommended. The standards have long been accepted by large purchasers of nursery stock,

New York City Department of Parks

Careful plant selection makes New York City's Conservatory Garden a welcome relief from drab city pavements.

such as the United States Bureau of Roads and the state highway officials, by park commissioners, by public building officials, and by landscape architects and contractors. The standards are also generally specified in federal and state bidding invitations.



Specific dimensions supplement this diagram of standard height-to-spread ratio of a cone-type evergreen.

These standards, however, do not prohibit commerce in plants not in conformity with the standards. In many instances, special specifications for plants are written into contracts to meet special needs. The landscape nurseryman in creating a particular landscape design often seeks and specifies plants of a character that would not conform to the American Standard Z60.1-1949. This is perfectly permissible and ethical.

The American Association of Nurserymen has an active standing committee on standardization. It considers suggestions for further revisions and expansions of the standard from time to time, makes its recommendations to the Board of Governors of the Association, which then considers the recommendations and acts upon them.

American Standard for Nursery Stock, Z60.1-1949, is not a static document. It is alive like the commodity to which it applies. The committee has already before it several worthy suggestions for improvement which will be considered in due course. When revisions are indicated, revisions will be made, thus keeping this standard at all times in tune with the needs of the industry and of the various classes of consumers of the products we produce.

Preferred Numbers

(*Continued from page* 297)

as previously discussed with a view to the designer's interest in Preferred Numbers, it is always possible to start with the wider step-ups of the 5-, or 10-series, and to supplement these, if necessary, later on with numbers belonging to the 20- and 40-series. The advantage of Preferred Numbers is that in such cases all those working on the same problem independently, but adhering to Preferred Numbers, will come to use the same values. Hence, Preferred Numbers lay a foundation for standardization in the future or, putting it differently, they help to make unnecessary the simplification that would become necessary if things were left to grow up in an uncoordinated manner.

In view of the values of Preferred Numbers as a tool for the designer and standardizer, either in laying out standard values as a skeleton for future specifications, or for the purpose of bringing order out of chaos by simplification, it is no wonder that Preferred Numbers have received international attention. In 1935, the former International Standards Association, or ISA, published its Bulletin No. 11, approved by a technical committee with representation from 15 countries, recommending the same basic set-up as given in the American Standard. However, the table in the ISA Bulletin lists the four series for the range 1 to 10, instead of 10 to 100, as we have it. Incidentally, in Europe the series are designated as R5, R10, R20, and R40, in honor of the French Colonel Renard, who developed it about seventy years ago.

In regard to the 80-series, briefly mentioned before, this is different in the American Standard and in the ISA Bulletin. The American Standard lists the 80-series, with values corresponding to the rounded geometric steps between 10 and 100. The ISA Bulletin does not list the 80-series, but recommends that the arithmetic averages of the values in the 40-series be used. Since the values of the 80-series are close together, there is not much difference between the American and the ISA values. However, it is not clear why the ISA committee decided to deviate here from true geometric progression, which is the most essential of the three main principles on which the Preferred Numbers are based, the other two being the adoption of the range 10 to 100 (and its multiples or submultiples) and the provision of 5, 10, 20, 40, and if necessary, 80 steps within each range.

The former ISA project on Preferred Numbers has been taken up again under the procedure of the International Organization for Standardization, or ISO, by technical committee ISO 19, with the French national standards body, AFNOR, as the secretariat. At the conference held in Paris last June, it was decided to adopt ISA Bulletin No. 11 as a basis for further work and the four basic series (5-, 10-, 20-, and 40-series) were approved again. It was further decided to add the 80-series as a separate one, and a change to the values of the geometric progression was favored. The Paris conference also decided to supplement the table giving the four basic series, by a note recommending their use in the order of their priorities, as discussed. The ASA committee on Preferred Numbers has decided to take an active part in this ISO work.

Clearly, Preferred Numbers have the greatest value, if applied to the same units of measurement. If the metric countries use them for setting up standards in metric units, and we use them for establishing standards in English units, the results will generally not be in harmony. However, just by accident, there is a favorable circumstance in regard to standards involving dimensions of length. The inch-millimeter conversion ratio for industrial use, 25.4, has practically become a world standard, following its adoption by the ASA and the British Standards Institution. The value 25.4 differs by only 1.6 percent from 25, which is a Preferred Number. Therefore, dimensions in inches, expressed by Preferred Numbers, when converted to millimeters, may be close enough to Preferred Numbers to permit rounding to the latter. This question and others concerning the practical application of Preferred Numbers will be studied by an ISO subcommittee, with representation from the following countries: Austria, Belgium, Czechoslovakia, France, Italy, Netherlands, Poland, Sweden, and Switzerland.

In addition to the benefit that will come from systematic application of Preferred Numbers for the international unification of standards, great value should be laid on the study of the principles and application of Preferred Numbers made by the various national standards bodies and the wider publicity that thus will be given this subject. In our own country, even though an American Standard was approved in 1936, there are still many opportunities, for example, in technical committees of the ASA, where Preferred Numbers can be put to work with great benefit.

Standards From Other Countries

MEMBERS of the American Standards Association may borrow from the ASA Library copies of any of the following standards recently received from other countries. Orders may also be sent to the country of origin through the ASA office. The titles of the standards are given here in English, but the documents themselves are in the language of the country from which they were received.

For the convenience of our readers, the standards are listed under their general UDC classifications.

332.1 Banking. Printed Forms

France

Credit Letter Acceptance Form, NF K11-37

614.8 Prevention of Accidents. Safety Measures

United Kingdom

Flameproof Industrial Clothing (Materials and Design), BS 1547:1949

616.5 Skin Diseases. Dermatology

Union of South Africa

Code of Practice for the Prevention and Treatment of Occupational Dermatitis, SABS 09-1948

621-5 Operation, Adjustment, and Control

Sweden

Handwheels and Handles for Machine Tool Control (Revised), SMS 80 and 81

621.3 Electrical Engineering

Argentina

Tubular Paper Capacitors for Radio Receivers, IRAM 4008

France

Standardization of Conventional Colors and Figures Used for Identification of Conductors, NF C33 (Suppl)

Germany

Self-cooling Oil Transformers, Three-phase, Up to 1600 kva and 30 kv, DIN 42510, Bl.1
Searchlight for Railless Battery Operated Electric Train, DIN 43542
Pilot Light for Indicating Switch-on and Brake-on Position for Battery Operated Electric Train, DIN 43546
Insulators for Indoor Places, DIN 48101, Bl.1
Rules for Layout of Telecommunication Lines in Respect to Three-Phase Power Lines and Vice Versa, DIN 57228
Rules Relative to Voltage and Current Transformers, DIN 57414
Rules for Producing and Applying Flash-over Voltage for Testing Purposes, DIN 57450
Instructions for Flexible Electric Heating Appliances, DIN 57725

Union of Soviet Socialist Republics

Mica Ribbon, GOST 4268-48
Control Electric Cables With Copper Core and Paper Insulation, GOST 4376-48
Graphite-Covered Electrodes and Nipples for Electric Arc Furnaces, GOST 4426-48
Insulating Tape, Cotton, GOST 4514-48
Roller-Type Insulators, GOST 4531-48
Electric Machinery, Dimensional Symbols for, GOST 4541-48
Three-Phase Asynchronous Electric Motors, Rating Scale, GOST 4542-48

United Kingdom

Telegraph Material, BS 16:1949
Charging Plugs-and-Sockets for Electric Battery Vehicles, BS 74:1949
Synthetic-Resin Bonded-Paper Sheets for Use at Power Frequencies, BS 1137:1949
Lighthouse Lamps (Electric), BS 1546:1949

621.5 Pneumatic Machines. Refrigeration Technology

United Kingdom

Acceptance Tests for Positive-Displacement Compressors and Exhausters, BS 1571-1949

621.6 Apparatus for Conveyance and Storage of Gases and Liquids. Conduits and Pumps

Germany

Pipe Plugs, Dimensions, DIN 2351
Screw Flanges, Various Types, DIN 2565-2569
Rolled-in Flanges, Various Types, DIN 2581; 2583
Slip-on Flanges, DIN 2641; 2667/8/9; 2673

Poland

Pipe Fittings, Signs, Indicating Operation of, PN N74002

United Kingdom

Cast Iron Sectional Tanks (Rectangular), BS 1563-1949
Pressed Steel Sectional Tanks (Rectangular), BS 1564-1949
Galvanized Mild Steel Indirect Cylinders, Annular or Saddle-Back Type, BS 1565-1949
Copper Indirect Cylinders, Annular Type, BS 1566-1949

621.791 Various Workshops and Processes for Treatment of Metals. Soldering. Welding. Cutting

Argentina

Welding — General Terminology, IRAM 522-P

Belgium

Code of Good Practice Relative to Steel Welded Construction. Section III — Filler Metals, NBN 203-1948

France

Acetylene Generators, Loading with Calcium Carbide, NF A84-132

Union of Soviet Socialist Republics

Arc Welding, Covering Materials of Electrodes for, GOST 4414-48

621.798 Packing and Dispatch Equipment

Union of Soviet Socialist Republics

Wooden Barrels for Caviar Packing, GOST 4283-48
Staves for Caviar Packing Barrels, GOST 4284-48
Wooden Boxes for Packing Window Glass Panes, GOST 4295-48
Shell Packing Cylinders, GOST 4367-48
Wooden Cases for Packing Ball- and Roller-Bearings, GOST 4391-48
Wooden Boxes for Packing Sugar Packages, GOST 4409-48
Metal Boxes for Transportation of 35-mm Cinematographic Film Cans, GOST 4430-48
Wooden Boxes for Packing Explosive Ammonium Compounds, GOST 4450-48
Metal Packing Boxes for Explosive Ammonium Compounds, GOST 4451-48
Wooden Boxes for Packing Cheese, GOST 4485-48
Packing Cases for Transportation of Bottles With Beverages, GOST 4486-48
Wooden Boxes for Peaches, Apricots, and Plums, GOST 4512-48
Wooden Packing Cases for Sausages and Other Smoked Products, GOST 4544-48
Plywood Packing Cases for Food Preserves, GOST 4551-48
Tea Packing Cases, GOST 4552-48
Wooden Packing Cases for Cookies, GOST 4554-48

United Kingdom

Tensional Steel Strapping (Packaging Code), BS 1133, Section 15-1949

621.8 Machine Parts. Hoisting and Conveying Machinery. Power Transmission. Means of Attachment. Lubrication

Austria

Elevators, Rules for Servicing and Operation, ÖNORM B2451
Elevators, Reception Tests, Inspection Tests, ÖNORM B2452

Germany

Overhead Console Bearing and Its Parts, DIN 752-754
Hexagon Nuts, Whitworth Thread, DIN 431
Rivets for Belting, DIN 675

Poland

Machine Screw, Flat Head, PN M82209/10; 82235/6
Machine Screw, Oval Head, PN M82211/2; 82255/6
Rivets, 2-9 mm in Diameter, PN M82951

Sweden

Grooved Pins, SMS 1331
Thread Designation (Revised), SMS 486

Union of Soviet Socialist Republics

Lubricating Oils, Re-used, GOST 4539-48

United Kingdom

Bevel Gears (Machine Cut), BS 545:1949
Unified Screw Threads, BS 1580:1949

621.9 Machine Tools. Tools. Operations, in Particular for Metal and Wood

Austria

Wrench Openings, ÖNORM M1610

France

Metallic Screen With Rectangular Mesh for Coal Screening, FD M No. 82-516

Poland

Wrench Openings, PN M02048
Square Tool Ends, PN N280
Tee-Slots, PN N561
Round Pliers, Short, PN N1760
Round Pliers, Long, PN N1761
Pliers, Side Cutters, Short, PN N1770
Pliers, Long, PN N1771
"Universal" Pliers, Flat-Nozed, PN N1780
"Universal," Half-Round-Nozed, PN N1781
Hack-Saw Blade, One-Sided, PN N2050
Hack-Saw, Two-Sided, PN N2055

Sweden

Eccentric Presses, SMS 845
Chisels, with Beveled Sides, SMS 1435

Union of Soviet Socialist Republics

4337-48 Thread Chasers, GOST 4335-48
Single Action Power Presses, GOST 4382-48
Glass Cutting Tool, GOST 4407-48
Broaches, Details of Cutting Edges of, GOST 4494-48

628 Sanitary Technology and Engineering. Sewerage. Heating. Illumination

Norway

Concrete and Reinforced Concrete Pipes, General Specifications, NS 460
Concrete Pipes, Dimensions, NS 461
Reinforced Concrete Pipes. Dimensions, NS 462

Sweden

Ventilator Grids and Ventilator for Residential Houses, Various Types, SIS 60 00 08

Union of Soviet Socialist Republics

Drinking- and Industrial-Water Supply. Methods of Chemical Analysis for Fluor Content, GOST 4386-48
Drinking- and Industrial-Water Supply. Methods of Chemical Analysis for Zinc Content, GOST 4387-48
Drinking- and Industrial-Water Supply. Methods of Chemical Analysis for Copper Content, GOST 4388-48
Drinking- and Industrial-Water Supply. Methods of Chemical Analysis for Sulfate-Ion Content, GOST 4389-48

629.11 Land Vehicles. Transport Engineering

Sweden

Bicycle Axles, Hubs, Pedals, Chains, etc, SMS 1306-1309; 1400-1410; 367; 372; 374-376 (Revised).

Union of Soviet Socialist Republics

Air-Brake for Cars and Trailers, GOST 4364-48
Air-Brake Attachment for Cars and Trailers. Coupling Head, GOST 4365-48

629.12 Ships and Shipbuilding

Norway

Sidelights, NS 341, Sh.1-4
Windows, NS 346, Sh.1-4
Fixed Light, NS 347
Fixed Windows, NS 348

Union of Soviet Socialist Republics

Connecting Nipple for Air Hose of Pontoon, GOST 4285-48
Ships Lights, Portholes, GOST 4290-48
Small Signal Appliances, GOST 4536-48

631.3 Agricultural Tools and Machinery

France

Caterpillar Tractors. Terminology of Dimensional Characteristics, NF U11-101
Splined Shaft of Tractors, NF U14-102 .

Union of Soviet Socialist Republics

Plough, Tractor Type, GOST 4396-48

United Kingdom

Mower Parts, BS 1562:1949

634 Fruit Cultivation. Tree Nurseries. Trees

Norway

Grading and Packing Rules for Norwegian Apples and Pears, NS 500c
Grading and Packing Rules for Norwegian Plums and Cherries, NS 501c

Union of Soviet Socialist Republics

Fresh Citrus Fruits, GOST 4508-4510-48

643 Household Equipment

Sweden

Cooking Ranges, Electric and Gas. Dimensions, SIS 60 52 07

Union of Soviet Socialist Republics

Aluminum Kitchenware, GOST 4502-48

651 Office Organization. Office Management

France

Employment Application Forms, NF Z45-004

United Kingdom

Office Equipment (Metal), BS 1558:1949

664 Preparation and Preservation of Solid Foodstuffs

Rumania

Marmalade, Specifications, STAS 5-49
Marmalade, Method of Test, STAS 70-49
Tomato Paste, Specification, STAS 6-49
Tomato Paste, Method of Test, STAS 10-49
Starch, STAS 7-49
Dextrine, STAS 8-49

Union of South Africa

Specifications for Canned Vegetables, SABS 79-1948
Specifications for Jams, Jellies, and Marmalades, SABS 80-1948

Union of Soviet Socialist Republics

Citrus Fruits, GOST 4427-48
Meat Paste Preserves, GOST 4476-48

665 Oils. Fats. Waxes

Argentina

Industrial Benzine, IRAM 1016-P

Rumania

Stand Oil, STAS 17-49
Petroleum Products. Determination of Organic Acid, STAS 23-49
Petroleum Products. Determination of Non-Saponinable Ingredients, STAS 29-49
Refined Petroleum Oil, STAS 30-49
Petroleum Gas, Liquefied, STAS 31-49
Benzine. Doctor Test, STAS 47-49

Sweden

Oils and Grease. Determination of Lowest Flow Temperature, SIS 15 02 09
Oils and Grease. Determination of Fuel Content in Crank Case Oil, SIS 15 02 14

Union of Soviet Socialist Republics

Flash-and Fire-Point by the Method of Open Cup (Brenken Method), GOST 4333-48
Determination of Maximum Height of Non-Smoking Flame of Petroleum Oils, GOST 4338-48
Standard Isooctane, GOST 4375-48
Standard Heptan, GOST 4375-48
Mineral Absorption Oil, GOST 4540-48

Uruguay

Mineral Spirit of Turpentine, UNIT 51-49
Doctor Test, UNIT 62-49
Determination of Flash Point of Volatile Liquids, UNIT 63-49
Distillation of Petroleum Products, UNIT 65-49

666 Glass and Ceramic Industry. Artificial Stone

India

Specifications for Moderate Heat Duty Fireclay Refractories, Group "B", IS:7-1949

Mexico

Portland Cement (Revised 1948 Edition), C 1-1948
Vitrified Clay Pipes (Revised 1948 Edition), C 7-1948

Sweden

Various Chemical Laboratory Glass Wares, Such as Centrifugal Tubes, Pipettes, Measuring Cylinders, etc, CSB 184/5; 247/8; 250; 252

Union of Soviet Socialist Republics

Fireproof Ceramic Products, GOST 4385-48
Ceramic Washing Basin, GOST 4550-48

667.6 Paints

Union of South Africa

Specifications for Yellow and Orange Chrome Pigments, SABS 64-1949
Specifications for Basic Carbonate White Lead, SABS 36-1948
Specifications for Basic Carbonate White Lead-in-Oil, SABS 44-1948
Specifications for Chrome Green Pigments, SABS 65-1949

668 Various Organic Chemical Industries

Poland

Turpentine, PN C97007

(*Continued on the next page*)

Standards

(*Continued from page* 301)

Union of South Africa

Specification for Edible Gelatine, SABS 49-1949

United Kingdom

Liquid Toilet Soap for General Purposes, BS 1545:1949

672 Articles of Iron and Steel

Argentina

Welded Steel Drums for Liquid Gases, IRAM 2527-P

Germany

Anti-Skid Chains, DIN 691
Roller Chains, DIN 8182

Mexico

Tinplates and Terneplates Used for Manufacture of Food Containers, B 34-1948
Terms Used in Tin-Can Containers Industry, B 35-1949
Tin-Can Containers for Food, B 36-1949

Union of Soviet Socialist Republics

Conveyor Chains, GOST 4267-48

686 Bookbinding. Gilding. Silvering. Mirrors and Frames. Glaziery. Writing and Office Necessities

Union of Soviet Socialist Republics

Graphite Copying Pencils, GOST 4447-48

United Kingdom

Bound Account and Manuscript Books (Other Than Scholastic Books), BS 1544:1949

69 Building Industry

Poland

General Rules for Structural Calculation, PN B3
Sampling of Stone Materials, PN B367

691 Building Materials

Argentina

Portland Cement Concrete, Method of Test, IRAM 1536-P
Rocks, Method of Test for Roughness, IRAM 1538-P
Concrete, Method of Compression Test, IRAM 1546-P
Unit Weight of Aggregates, IRAM 1548-P
Granulometric Analysis of Fine Aggregates, IRAM 1502

Austria

Testing of Cement, ÖNORM B3312

Belgium

Iron Cement (Fine Mixture of Portland Cement Clinker and Blast Furnace Slag), NBN 198-1948

Rumania

Sand, STAS 3-49

Union of Soviet Socialist Republics

Cement Blocks. Specifications, GOST 4334-48

Link-Belt

(*Continued from page* 284)

of spare parts or repair parts of equipment sold them.

Summary

Link-Belt Company's experience with standards has resulted in the development of a set of concepts and conclusions that might be considered to form their philosophy of standardization. We give some of them here with the hope that they may prove of value to others who may be developing or expanding a standardization program.

— Standards are important tools of modern industry. They are necessary for the efficient conduct of manufacturing enterprise whenever the coordination of the activities of several groups performing related functions is involved.

— Standards are especially necessary to an organization composed of a number of engineering offices and manufacturing plants that are geographically separated.

— A central standardizing group is essential to an organization made up of a group of autonomous or semi-autonomous design and manufacturing units.

— Individual company standards should make the fullest possible use of the standards and specifications set up by industry and technical society standardizing bodies and help promote the activities of these organizations in order to realize the benefits of increased availability and lower costs that should result from their development and use.

— Standardization that involves extensive change in existing procedures should be put into use gradually and should be carefully watched and evaluated during its initial uses. The initiation and use of standards is not a natural nor easy process. Change is resented and sometimes attended by confusion. Progress is often slow to be recognized by individuals or small groups in the lower echelons of an enterprise. Oft-times the efficient use of new procedures and standards is handicapped by a natural tendency to graft the new onto the old less efficient or desirable methods rather than make a clean cut substitution.

— The greater accuracy and definition of a modern standard requires that more care be taken in its use than was necessary with the older types of more general and often incomplete standards and often only this need for additional care is seen when new standards are first put into use. The gain in efficiency through the use of new standards is sometimes hard to demonstrate as the losses due to poor standards or lack of standards are largely hidden, and existing performance, no matter how poor, has become the norm.

— Standardization is not regimentation. It is organization. As only the well organized activities of civilization prosper, the need for continual development and maintenance of standards is obvious.

— Standardization in no way handicaps the creative function in engineering, foresight and skill in purchasing, or the development of improved manufacturing methods and processes. When properly conceived and executed it eliminates much drudgery and mechanical effort on the part of the creative worker and executives engaged in these activities. It frees them of much that handicaps and limits their efforts and enables them to intensify their study of the problems that only they can solve.

— Intensified competitive market conditions requiring increased efficiency in production lie ahead of us. Proper standards maintained at a high level are one of the more important means for controlling and lowering costs while at the same time increasing the intrinsic value of manufactured products.

In the years ahead, Link-Belt Company will continue to expand and improve the standardization required to simplify and improve the conduct of its many internal activities. We will also take our part in the development of national and international standards and promote their value and standing through use wherever they meet our own requirements.

H. M. Lawrence, Materials Engineer on the ASA staff, represented the Association at the United Nations Scientific Conference on the Conservation and Utilization of Resources, held August 17 through September 6. Although standardization did not specifically enter into the discussions, Mr Lawrence reports that the use of standards was implicit in many of the suggestions for the most efficient use of the world's resources. Mr Lawrence attended sessions on coal production and carbonization, utilization of energy, mineral supplies, and conservation of fertilizers.

News Briefs

• • Replies to a recent questionnaire sent to national committees of the International Electrotechnical Commission show that the following projects are considered urgent for action during the next year or two:

Revision of the International Electrotechnical Vocabulary Rotating machinery
Revision of Graphical Symbols for Heavy-Current Systems and of Graphical Symbols for Weak-Current Systems
Publication of International Specifications for the Resistivity of Aluminum and of International Specification for Aluminum for Insulated Cables
Standard Voltages
Standard Current Ratings
Porcelain Insulators for Overhead Lines of 1000 V and Upwards
Bushing Insulators
Exact Value of the Low Tension Supply Voltage Around Either 110-115 V or 220-250 V
Revision of the Rules for Electric Traction Motors
Rules for the Equipment and Apparatus for Fixed Installations for the Supply of Electric Traction Systems
Rules for Transformers and Equipment Used on Rolling Stock
Auxiliary Motors on Rolling Stock
International Aging Test Method for Transformer Oils
Safety Requirements for Radio Receiving Apparatus
Radio Components
Transformers
Revision of specification for a-c circuit breakers—Chapter I on Rules for Short-Circuit Conditions; and preparation of chapters on rules for normal-load conditions, on the strength of insulation, on selection of circuit-breakers in service, and on maintenance of circuit-breakers in service
Electrical Installations on Ships, program of work agreed on at the London meeting of committee A.C. 18
Starter batteries
Ionic converters
Plugs and sockets for domestic use
Connectors
Micro-fuses
Electric and magnetic magnitudes and units—choice of the fourth unit of the MKS Giorgi system; and rationalization of electric and magnetic units
Revision of International Electrotechnical letter symbols
Coordination of insulation
Construction of the enclosures of flame-proof apparatus
Fuses
Shunt capacitors for power systems
Lamp caps and holders
Dry cell batteries—types, sizes, connecting arrangements, and methods of test

• • Complimenting the members of Subcommittee G on Underwater Sound Measurements for completing work on their part of the proposed American Standard on Acoustical Terminology, Dean Vern O. Knudsen, chairman of the ASA sectional committee on Acoustical Measurements and Terminology said:

"I believe that this subcommittee did its work unusually well, and that their work has led to definitions and standards that will long serve the interests of acoustical investigators and also our own national defense."

• • An Egyptian standards organization has been formed by the Royal Egyptian Engineering Society in Cairo. Various committees have been formed and are already at work, particularly on mechanical, electrical, and civil engineering specifications.

At the request of the society, the American Standards Association will exchange with it reports of the work of its committees.

• • Reports of the progress made by the states in the field of industrial accident prevention and amendments to technical committee reports drafted by the conference held last March will be discussed at the Progress Report meeting of the President's Conference on Industrial Safety. The meeting is planned for June 5, 6, and 7, 1950, in the Departmental Auditorium in Washington, D. C.

Attendance to the June sessions will be limited to state governors or their representatives, the coordinating committee officers and members of the technical committees, and key representatives of labor, management, and organizations with a specific interest in industrial safety.

• • Considerable publicity has been given recently in the daily press in Canada to the need for standardization of fire hose couplings so that Canadian municipalities may give mutual aid in fighting conflagrations. This has pointed to the importance of the Canadian project on 2½ in. fire hose couplings which, under the chairmanship of J. E. Ritchie, deputy fire marshal of Ontario, is nearing the point where final approval and publication is anticipated.

"The significance of this project in relation to plans for civil defence, as well as in normal fire prevention requirements, is obvious," the Canadian Standards Association announces.

• • Robert A. Seidel, chairman of the ASA Consumer Goods Committee and former vice-president and comptroller of W. T. Grant Company, has joined the RCA Victor division of Radio Corporation of America as vice-president in charge of distribution. Mr Seidel, who is well known for his activities in the National Retail Dry Goods Association, is a member of the Board of Directors of the American Standards Association.

• • The objectives, problems, and responsibilities of the Illuminating Engineering Society were recently reviewed by the newly elected president of the society, Charles H. Goddard, manager of utility sales of Sylvania Electric Products, Incorporated. Commenting specifically on American Standard Practice for School Lighting, A23.1-1948, co-sponsored by the American Institute of Architects and the Society, Mr. Goddard praised the committee's work for having "brought together the very latest thinking on modern school lighting and having made the standard available in time to aid materially in the proper lighting of schools."

• • Visiting the U.S. Testing Company Laboratories September 29, members of the Rayon Finished Fab-

rics Committee took advantage of an opportunity to see at first hand what goes on when fabrics are given performance tests. The 28 representatives of women's groups, retail organizations, and garment manufacturers were taken on special tours to view the entire operation of the laboratories—from the battering of a basketball to test its performance life to the nursery of especially bred carpet beetles used in testing the resistance of carpet and upholstery materials.

Many of those who went on the tour have only slight personal knowledge of the technical problems entering into the application of standards. The tests on those characteristics which have been given special attention in the committee's work were explained in greatest detail—particularly shrinkage, color fastness, light fastness, crocking, gas fading.

The U.S. Testing Company is a private organization that carries out tests on any product on a fee basis. In addition to checking specific items, the company will set up a testing program on contract as a basis for certification of the product.

• • A comprehensive description of "How to Use Woodworking-Machine Guards" based on the Appendix to the American Standard Safety Code for Woodworking Machinery is published in *Safety Engineering*, September, 1949. This is the first of a series of three feature articles concerned with guards for machines.

• • Reports that India has increased its production in major industries by about 25 percent in the past two years call attention to the part standardization played in arriving at this impressive record. Under the able direction of Dr Lal Verman, recently elected vice-president of the International Organization for Standardization, the Indian Standards Institution has not only set up committees for development of industrial standards, but also has taken an active part in the international program. Among the important industrial standards which have helped to build up India's industrial production have been the American Standards for Quality Control. These standards, put into effect as one of the primary steps for development of the country's industries, have given a sound basis for the production of goods of sound quality.

• • Over 85 percent of the lighting in the average American city is inadequate, according to surveys made by the National Electrical Manufacturers Association reports.

The survey used American Standard Practice for Street and Highway Lighting, D12.1-1947, as the basis for judging the adequacy of the lighting. Measurements with footcandle meters indicate that only nine percent of areas surveyed showed readings of 16 footcandles and better whereas the American Standard recommends 50 footcandles of illumination.

Lester S. Corey, New ASA Board Member

Lester S. Corey, president and general manager of the Utah Construction Company, has been elected to serve as a member-at-large on the Board of Directors of the ASA.

Joining the Utah Construction Company in 1901 Mr Corey worked successively as timekeeper, paymaster, foreman, superintendent, and assistant secretary. In 1928 he was elected secretary and treasurer, and from 1931 to 1940 he was vice-president and manager. Since 1940 he has been president and manager of the firm.

Utah Construction president elected to ASA Board.

Mr Corey is associated with the President Argonaut Company, Ltd, the Compania Utah of South America, and the Bonham Manufacturing Company. He also serves as director of the First Security Company, the Consolidated Builders, Inc, the Oregon Shipbuilding Company, the Permanente Cement Company, the Permanente Steamship Company, the Glazier Sand & Gravel Company, the Joshua Hendy Corporation, the Columbia Construction Company, and the Wooldridge Manufacturing Company.

Screw Threads

(*Continued from page* 291)

impair in any respect the development of the ISO metric threads and would present at once a general international basis of unification. Obviously, this is a matter to be decided entirely by the metric countries.

The Paris conference further drafted the broad outline of a program of work, to be developed further by a small working commission advisory to the Swedish secretariat. The U.S. delegation, as well as the British, agreed to assist in this development and also, to lend whatever technical assistance might be helpful in the establishment of thread tolerances for the ISO metric threads. Some of the metric countries showed deep interest in the data on limiting sizes for screw threads, and the formulas on which these data are based, given in the new American Standard.

It appeared at the Paris conference that there was a feeling in some metric countries that the unification of the inch thread systems should preferably have been handled under ISO procedure, or in other words, that the inch countries had "beaten the gun" in reaching agreement among themselves. In this respect, it should be realized that the American-British-Canadian unification is the result of efforts started thirty years ago, speeded up under the pressure of the emergency that arose in World War II, and completed in principle at the Ottawa conference in 1945, that is, before the ISO had been organized. Moreover, it was clear—even before the Paris conference—that for a number of years to come, there still will be a need for thread systems in inch units, as well as in metric units, and that the abolishment of either of them, or their merger, for the sake of having a single international system, would be impossible at this time. However, a considerable gain has been made in that the world at large, instead of having to deal with three major systems (American, British, and metric), now has to deal with only two: the Unified System and the metric. Whether in the more distant future it will be possible to establish a single world system, is a question too momentous to be answered at the present time. But unanimous agreement on at least one basic feature of such a single system, the thread form, has already been reached. Therefore, the adoption of the profile of the Unified System as the ISO Basic Profile may be considered a significant step on the difficult road to world unification of screw thread practice.

ASA STANDARDS ACTIVITIES

Status as of October 6, 1949

American Standards Approved Since September 1, 1949

Nomenclature, Definitions, and Letter Symbols for Screw Threads, B1.7-1949
Sponsor: Society of Automotive Engineers; American Society of Mechanical Engineers

T-Slots, Their Bolts, Nuts, Tongues, and Cutters, B5.1-1949 (Revision of B5.1-1941)
Sponsors: American Society of Mechanical Engineers; Metal Cutting Tool Institute; National Machine Tool Builders' Association; Society of Automotive Engineers

Vulcanized Fibre, (NEMA VUI-1949) C59.20-1949 (Revision of C59.20-1945)
Sponsor: American Society for Testing Materials

American Standards Being Considered for Approval

By the Standards Council—

Specifications for Zinc Yellow (Zinc Chromate) (Revision of ASTM D478-47; ASA K50.1-1947)

Specifications for Raw Linseed Oil (Revision of ASTM D234-28; ASA K34-1937)

Specifications for Boiled Linseed Oil (Revision of ASTM D260-33; ASA K35-1937)

Specifications for Slab Zinc (Revision of ASTM B6-48; ASA H24.1-1948)
Sponsor: American Society for Testing Materials

By the Consumer Goods Committee—

Definitions of Terms Relating to Textile Materials, (Revision of ASTM D123-48; ASA L14.12-1949)

Methods of Test for Asbestos Yarns (Revision of ASTM D299-48T; ASA L14.18-1949)

Methods of Test for Woolen Yarns (Revision of ASTM D463-48T; ASA L14.21-1949)

Methods of Test for Worsted Yarns (Revision of ASTM D404-48T; ASA L14.22-1949)

Methods of Testing and Tolerances for Jute Rope and Plied Yarns for Electrical Packing Purposes (Revision of ASTM D681-48; ASA L14.44-1949)
Sponsor: American Society for Testing Materials

Dimensions, Tolerances, and Terminology for Cooking and Baking Utensils, Z61.1
Sponsor: American Home Economics Association

By the Electrical Standards Committee—

(The following standard has also been referred to the Consumer Goods Committee)
Household Automatic Electric Storage Type Water Heaters, C72
Sponsor: National Electrical Manufacturers Association

By the Mechanical Standards Committee—

Cast-Iron Screwed Fittings, 125 and 250 lb, B16 (Revision of B16d-1941)
Sponsors: American Society of Mechanical Engineers; Manufacturers Society of the Valve and Fittings Industry; Heating, Piping and Air Conditioning National Association

Standards Submitted

Gaging Practices for Ball and Roller Bearings, B3.4
Sponsor: Mechanical Standards Committee

Recommended Practice for Mechanical Refrigeration Installations on Shipboard, B59

Method of Rating and Testing Refrigerant Expansion Valves, B60
Approval Requested by: American Society of Refrigerating Engineers

Methods of Testing Antennas, IRE-1948; ASA C16.11

Methods of Testing Frequency Modulation Broadcast Receivers, IRE-1947; ASA C16.12

Methods of Testing Television Receivers (Monochrome Service, 6-Megacycle Channel), IRE-1948; ASA C16.13

Color Codes: Numerical Values, Decimal Multipliers and Tolerances, RMA GEN-101; ASA C16.14

Preferred Values for Components for Electronic Equipment, RMA GEN-101; ASA C16.15

Vibrating Interrupters and Rectifiers for Auto Radio: Frequency 115 Cycles, RMA REC-113; ASA C16.16
Sponsor: Institute of Radio Engineers

Industrial Apparatus Control, C19.1
Sponsor: American Institute of Electrical Engineers

Methods of Sampling and Chemical Analysis of Alkaline Detergents (Revision of ASTM D501-46; ASA K60.21-1948)
Sponsor: American Society for Testing Materials

Withdrawal of American War Standards Being Considered

Fixed Paper-Dielectric Capacitors (Home Receiver Replacement Type), C16.6-1943

Dry Electrolytic Capacitors (Home Receiver Replacement Type), C16.7-1943

Simplified List of Home Radio Replacement Parts (Paper and Electrolytic Capacitors

Volume Controls, Power and Audio Transformers and Reactors), C.16.8-1943

Volume Controls (Home Receiver Replacement Type), C16.10-1943
Requested by: Institute of Radio Engineers

Specification for Projection Equipment, Sound Motion Picture 16-Mm, Class 1 (JAN-P-49), Z52.1-1944

Specification for Test Film for Checking Adjustment of 16-Mm Sound Motion Picture Projection Equipment, Z52.2-1944

Specification for 16-Mm Motion Picture Release Prints (JAN-P-55), Z52.3-1944

Method of Determining Picture Unsteadiness of 16-Mm Sound Motion Picture Projectors, Z52.6-1944

Method of Determining Uniformity of Scanning Beam Illumination of 16-Mm Sound Motion Picture Projectors, Z52.7-1944

Leaders, Cues, and Trailers for 16-Mm Sound Motion Picture Release Prints Made from 35-Mm Preprint Material, Z52.19-1944

Leaders and Trailers for 16-Mm Sound Motion Picture Release Prints Made from 16-Mm Original Material, Z52.31-1945

Whiteness of Projection Screens (Semi-Diffusing Reflecting Surface), Z52.45-1945

Brightness Characteristic of Projection Screens (Semi-Diffusing Reflecting Surface), Z52.46-1945

Picture and Sound Synchronization Marks for 35-Mm and 16-Mm Sound Motion Picture Release Negatives and Other Preprint Material, Z52.53-1945

Direct Finder Aperture for 35-Mm Motion Picture Cameras, Z52.68-1946

Auxiliary Finder Aperture for 35-Mm Motion Picture Cameras, Z52.69-1945

Specification for Registration Distance and Lens Mounting Dimensions for 35-Mm Motion Picture Cameras, Z52.70-1945
Requested by: Society of Motion Picture Engineers

Withdrawal of American Standards Being Considered

Standard Vacuum Tube Base and Socket Dimensions, C16.2-1939

Manufacturing Standards Applying to Broadcast Receivers, C16.3-1939

New Project Initiated

Rotary Cone Valves
Sponsor: American Society of Mechanical Engineers

What's Happening on Projects

Rotary Cone Valves B61—

Sponsor: American Society of Mechanical Engineers

The Mechanical Standards Committee has approved the initiation of a project on rotary cone valves under the ASA procedure. Approval was also given for the designation of the American Society of Mechanical Engineers as sponsor for the project. The proposed scope of the project is to standardize dimensions and performance characteristics of rotary cone valves for water supply purposes.

Standardization of Gears, B6—

Sponsors: The American Society of Mechanical Engineers; the American Gear Manufacturers Association

Administrative sponsors for Sectional Committee B6 announce distribution for sectional committee vote of the proposed American Standards on (1) 20-degree Involute Fine-Pitch System for Spur and Helical Gears, (2) Fine-Pitch Straight and Bevel Gears, (3) Design for Fine-Pitch Worms and Worm Gears. Descriptions of the tentative drafts follow and copies may be obtained by writing Mr S. A. Tucker, Standards Manager, The American Society of Mechanical Engineers, 29 West 39th Street, New York 18, N. Y.

Fine-Pitch Straight Bevel Gears—Technical content of this standard is identical

with that of the AGMA standard with modifications concerning clearances, tooth thicknesses, and maximum face width. The standard covers generated straight bevel gears of 20 diametral pitch and finer, all shaft angles, and with the numbers of teeth equal to or greater than 16/16, 15/17, 14/20, 13/30 for 90-degree shaft angle.

20-Degree Involute Fine-Pitch System—This standard is very similar to the American Standard for Spur Gear Tooth Form with a slight increase in whole depth to allow for the greater proportional clearance necessary in fine-pitch gears. The fine-pitch series includes gears of 20-diametral pitch and finer having a 20-degree pressure angle.

Design for Fine-Pitch Worm Gearing—This standard is intended as a design procedure for fine-pitch worms and worm gears. It covers worms and worm gears with axes at right angles, comprising cylindrical worms and helical threads, the worm gear being hobbed for fully conjugate tooth surfaces.

V-Belts and V-Belt Drives, B55—

Sponsor: American Society of Mechanical Engineers; National Machine Tool Builders Association

Calling an organization meeting for this new committee for October 17 in connection with the Metal Show at Cleveland, Ohio, the American Society of Mechanical Engineers, administrative sponsor, announces that Colin Carmichael, editor of *Machine Design* and editor of the "Design and Production" Volume of *Kent's Mechanical Engineers' Handbook* has accepted the chairmanship of the new committee. Organizations invited to cooperate include: Air Conditioning and Refrigerating Machinery Association; American Institute of Electrical Engineers; American Society of Heating and Ventilating Engineers; Association of Manufacturers of Wood Working Machinery; Multiple V-Belt Drive Association and Mechanical Power Transmission Association; National Association of Textile Machinery Manufacturers; National Electrical Manufacturers Association; Power Transmission Association; Rubber Manufacturers Association, Inc; Power Transmission Council; Society of Automotive Engineers; Packaging Machinery Manufacturers Institute; Pulp & Paper Machinery Association; Machinery and Allied Products Institute.

Recommendations on additional representation will be requested at the meeting.

Pipe Threads, B2—

Sponsors: American Gas Association; American Society of Mechanical Engineers

Professor Herman C. Hesse, Dean of the College of Engineering, Valparaiso University, Valparaiso, Indiana, has been appointed chairman of the Sectional Committee on Pipe Threads, the American Society of Mechanical Engineers, administrative sponsor for the committee, announces. Members of the committee have been asked to review their representation to assure active participation in the committee's work. A reorganization meeting, held October 10, had not been reported at the time this issue went to press, but was expected to cover a discussion of the method of committee operation; recommendations to the sponsors for additional representation; review of the scope of work; and assignment of the work to various subcommittees.

Standardization of Shafting, B17—

Sponsor: American Society of Mechanical Engineers

A detailed program of committee activity and a review of members of subcommittees and subgroups are on the program of the reorganization meeting of this sectional committee scheduled for October 11. Professor Herman C. Hesse, dean of the College of Engineering, Valparaiso University, Valparaiso, Indiana, has been appointed to serve as the new chairman.

"While the need for transmission shafting standards has decreased, due to the trend of the individual drive for machines, it is noteworthy that 534 copies of these three standards [the American Standard for Shafting and Stock Keys, B17.1-1943; Code for Design of Transmission Shafting, B17c-1947, and Woodruff Keys, Keyslots, and Cutters, B17f-1947] were sold between October 8, 1948 and July 1, 1949," the ASME declares in announcing the reorganization plans for Committee B17. "In view of this continuing demand, it would seem wise to review these standards to determine the desirability of improvement," the ASME continues. "This is especially true because there is a serious conflict between the dimensions for parallel side keys, as established in this standard, and the manufacturers' dimensions on key stock. The drafters of the original standard, Shafting and Stock Keys, B17.1-1943, established a positive dimension on key stock to permit fitting of keys to keyways. Apparently, manufacturers of key stock prefer negative dimensions which agree with normal production practices."

Safety Code for Bakery Equipment, Z50—

Sponsor: American Society of Bakery Engineers

ASA Sectional Committee on Safety Code for Bakery Equipment, Z50, under the chairmanship of Armand Hecht, met in Atlantic City on October 20 to consider various suggestions that have been made about American Standard Safety Code for Bakery Equipment, Z50.1-1947, which has been in use for two years.

Senate Bill

(*Continued from page 287*)

pal office a record, giving the names and addresses of its members entitled to vote. All books and records of the corporation may be inspected by any member or his agent or attorney, for any proper purpose at any reasonable time.

SEC. 14. (a) The financial transactions of the corporation shall be audited annually for the fiscal year ending on June 30 of each year by an independent certified public accountant in accordance with the principles and procedures applicable to commercial corporate transactions and under such rules and regulations as may be prescribed by the Comptroller General of the United States. The audit shall be conducted at the place or places where the accounts of the corporation are normally kept. All books, accounts, financial records, reports, files, and all other papers, things, or property belonging to or in use by the corporation and necessary to facilitate the audit shall be made available to the certified public accountant, or his representatives, conducting the audit; and full facilities for verifying transactions with the balances or securities held by depositors, fiscal agents, and custodians shall be afforded to such accountant or his representatives.

(b) The corporation shall file with the Comptroller General, in accordance with such regulations and upon such forms as he shall prescribe, a complete statement of each annual audit (which shall be retained by the Comptroller General as a public record for not less than ten years), verified by the certified public accountant by whom the audit is made.

SEC. 15. The corporation shall have in the District of Columbia at all times a designated agent authorized to accept service of process for such corporation. Notice to or service upon such agent, or mailed to to the address of such agent, shall be deemed notice or service upon the corporation. For purposes of court jurisdiction based upon diversity of citizenship the corporation shall be deemed to be a citizen of the State of Maryland.

SEC. 16. Dissolution of the corporation shall require a two-thirds vote of the member-bodies. Upon dissolution of the corporation the funds, reserves, and other assets of the corporation shall, after payment of all just debts and liabilities, be divided and refunded, without interest, to the members of the corporation on the date of dissolution in proportion to the amount of dues, initiation fees, assessments, and contributions paid by such members during the five fiscal years immediately preceding the fiscal year in which such dissolution takes place: *Provided*, That no member shall be refunded an amount in excess of the total amount of dues, initiation fees, assessments, and contributions paid by such member during its period of membership, and any such excess amounts shall be distributed to organizations selected by the board of directors which are organized and operated exclusively for charitable, scientific, literary, or educational purposes, no part of the net earnings of which inure to the benefit of any private shareholder or individual, and no substantial part of the activities of which is carrying on propaganda or otherwise attempting to influence legislation.

SEC. 17. Nothing in this Act, including participation by any designated representative of the United States Government in the standardization work of the corporation, shall be construed to affect or limit the application of the Antitrust Laws to the development, approval or use of standards.

SEC. 18. The right to alter, repeal, or amend this title is hereby expressly reserved.

Technique Seminar

(*Continued from page 285*)

tion of maximum permissible gage variations in relation to part limits. Effect of gaging method on acceptance of parts. Gage zone system for harmonizing workshop, delivery, and acceptance inspection. Review of American, British, and ISA gaging systems.

7. The four stages of industrial standardization: in a company; in a technical society or trade association; on a national scale; and on an international scale. Effect of two world wars on development of

industrial standardization. The American Standards Association (ASA), national standards bodies in other countries, and the new International Organization for Standardization (ISO).

8. Organization of standardization work in an individual manufacturing concern. Development, approval, introduction, and maintenance of company standards. Coordination of departmental functions. Importance of top management's attitude. Company Standards Committee and standards department. Position and functions of company standards engineer. Relations between company and outside standardization activities.

9. Different forms of industrial standardization. Simplification of varieties of types and sizes of products by mere elimination. Revision of existing products based on engineering considerations. Design of new standards as a guide for future product development. Use of Preferred Numbers and prefernographs in laying out rational series of standard values.

10. Principles and technique of formulating industrial standards. Balance between strictness and flexibility of specifications. Composition, property, and process specifications. Necessary, desirable, acceptable, and prohibitive quality characteristics. Clauses on sampling, inspection, and testing. General form, arrangement, and wording of standards. General guide for the design of standard specifications.

Ball and Roller Bearings

(*Continued from page* 293)

pointed to study this subject further, with a view to presenting a proposal at the next conference. This was accepted and a subcommittee with representation from France, Italy, Sweden, Switzerland, the United Kingdom, and the United States was appointed. The United States is in charge of the secretariat.

The ISO committee agreed further that the general plan of boundary dimensions of radial bearings (other than tapered roller bearings) discussed at the Paris conference and the changes in that plan proposed by some of the delegations, should be given further consideration by the participating countries.

Concluding, it may be said that the active participation of American industry in the work of the ISO committee on Ball and Roller Bearings has yielded the following results. Changes in the ISO plan of boundary dimensions for radial bearings (other than tapered roller bearings) desirable from the American point of view, will be given further consideration. American industry will take an active part in the formulation of the scope of the work and the establishment of a program, including the assignment of priorities to different subjects. Finally, the standardization of tapered roller bearings, in which little consideration has been given so far to the American viewpoint, has now been assigned for advice to a subcommittee on which the United States is represented and for which it has assumed the secretariat. It would seem, therefore, that from now on the American viewpoint may be expected to get more consideration than it has received before and that the United States consequently will be able to exert such leadership as is justified by its position in the world's antifriction bearing industry.

Limits and Fits

(*Continued from page* 289)

sented in this case by ASA committee B4 dealing with Limits and Fits, will be served by active American participation in the work of ISO technical committee 3 on this subject. Incidentally, the British had already decided on formal and active participation, and their delegation at the Paris conference had voting power. We believe also that American industry, through ASA committee B4, can take a major part in the further effort to develop a universal, practical standard for cylindrical fits. The immediate problem before this committee is to complete our job here at home and definite steps to this effect are now being taken.

No report of the ISO meetings would be complete without a word of high praise for the excellent planning by the staff of the French national standards body, the AFNOR, which acted as host for the ISO conferences. Excellent care was given to the comfort and convenience of the delegates. Hotel accommodations were handled efficiently, visits to points of interest were well scheduled, and even the serving of refreshing drinks at the meetings was timed to perfection. The weather, although a factor not under control of the AFNOR, was ideal throughout the entire duration of the Conferences.

Each and every one of the American delegates participated in the technical sessions, and in the huddle or rump sessions which followed each technical meeting. The blackboards caught it, at such times. Throughout our trip we acted collectively, as a team under the able leadership of our chairman, Mr George S. Case. The work of Dr Gaillard, of the ASA staff, on one occasion is worthy of special mention. To clarify a point on which a warm debate had developed, he gave an able explanation first in English and then in French. Spontaneous applause at the conclusion of his remarks reflected the interest and appreciation of the delegates.

The American Delegates—Messrs Case, Fullmer, Holmes, Gaillard and myself—are deeply gratified that we were privileged to attend several sessions of the ISO Conference at Paris this past summer. It is an honor and a pleasure which we shall long remember.

Three Projects Completed; Code is Widely Circulated

The Board of Codes and Standards of the American Society of Mechanical Engineers reports that three major projects, which it has had under its supervision during the past year, have been completed. These include the American Standard Plumbing Code (A40.7-1949), the American Standard Unified and American Screw Threads (B1.-1949), and Section VIII of the ASME Boiler Code (Unfired Pressure Vessels), which appeared in approved form in September, 1949.

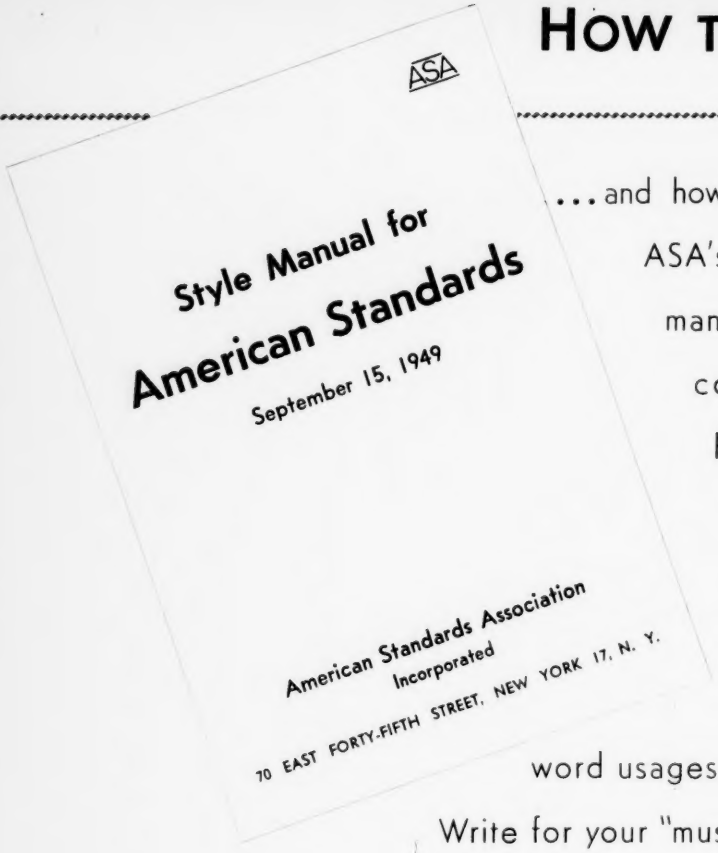
The American Standard Plumbing Code has already had wide circulation, the Board reports, with a printing of 6,500 copies sold out. It has been implemented by action of New York State which has stocked 1,500 copies for issue in a special cover to counties and municipalities as recommended practice. Other states have been invited to follow this procedure. A coordinating committee is now attempting to harmonize the codes of other organizations concerned with plumbing into a single code acceptable throughout the country.

The screw thread standard is being put into effect as rapidly as possible by government agencies, automotive and aircraft industries, and the screw and bolt industries, with 4,000 copies now in circulation.

New construction can be undertaken immediately under the revised Unfired Pressure Vessel Code wherever inspection authorities approve, the Board explains. The existing unfired code and its Interpretations remain in force as an interim document, however, and still covers cast iron, high alloy, nonferrous and clad materials, and vessels of brazed and integrally forged construction.

During the past year, 21 of the 26 standards and revisions of standards approved by the ASME Board were recommended as American Standards. This compares with a previous average of 11 sent to the American Standards Association the previous year. The Board now expects 45 individual projects to be completed during the coming year.

HOW TO WRITE IT!



...and how to print it. Here's ASA's own working style manual—up-to-date and complete between handsome, salmon-pink durable covers. Solidly factual on grammar, punctuation, and word usages. Just off the press! Write for your "must" copy now, $1.00.

Where does the elusive comma go—inside the quotation marks or outside? How about hyphenating words, compounding adjectives, using italics, and not misusing footnotes; what should you do with letter symbols, charts, and graphs? Maybe you have a firm grasp on the situation and know when to blue-pencil the comma and when to leave it in. If not, you'll do what ASA staff members do—reach for a copy of the STYLE MANUAL FOR AMERICAN STANDARDS. See page 285 of this issue of STANDARDIZATION for a fuller description of the new style manual. Special reductions in price for lots of ten or more. For your single copy, mail your dollar and request to the American Standards Association, 70 East 45th Street, New York 17, N. Y.